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Precision SHOOTING

Captain Arthur Cook, USAFR, defending champion, congratulates Victor L. Auer, A/3 USAFR, on winning the 1961 National Smallbore Rifle Championship.

a magazine for Shooters by Shooters

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Editor—P. H. Teachout
President—Crawford H. Hollidge
Vice-President—Robt. Stinehour
Treasurer—P. H. Teachout
Clerk—Frederick G. Mehlman

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A SIGHT PICTURE OF THE 1961 NATIONAL SMALLBORE RIFLE CHAMPION

By Betty Summerall Duncan

"On an Auer-ly basis, depend on Vic for victories . . .", to quote a California sportswriter. Aside from a mere journalistic play on words, the statement reveals the key to Victor Auer's long string of smallbore rifle championships, culminating in the 1961 national title. He is consistent!

A product of the Brea (Calif.) Junior Rifle Club and the Los Angeles Rifle and Revolver Club, Vic has been setting national records since he was knee-high to a hunting dog. His collection of national record certificates now numbers 52. To those who are superstitious, there might be a mystic connotation here as Vic shoots a Winchester 52.

He won his first regional in 1953, at the age of 15, on the tricky Phoenix, Arizona range. The following year he made the Dewar International Team at Camp Perry, which is quite an accomplishment for a 16 year-old, and since that time has been a firing member of the Dewar team each succeeding year in which he has competed in the national matches. In 1955 Vic was co-holder of the National Junior Championship with his teammate, Bill Grater, the same year in which he teamed up with his father, Leland, to win the Randle Doubles match at Camp Perry. He was an alternate on the 1956 Olympic team. His shooting career should prove both an inspiration and a challenge to the current fine crop of junior shooters, and perhaps encourage them to stay in the shooting game rather than succumbing to more worldly interests.

When the Western Nationals smallbore tournament was inaugurated in 1957, this 19 year-old near-sighted lad, wearing contact lenses, captured all three aggregates and a trip to the Nationals, where he annexed high Collegiate honors. The next three years he was absent from the tournament circuit and his shooting was limited to the gallery, as a member of the UCLA varsity team, where his energies were concentrated toward getting a degree in English (which he received in June 1961).

Representing the Continental Air Command, A/3 Auer, USAFR, returned to Camp Perry in 1960 and placed second to the famous "Cookie" (see cover), and again won the Collegiate Championship. The 1961 Nationals rounded out all of the smallbore championships for Vic as his 4784X352 over a field of 712 resulted in the Service Championship as well as over-all winner.

The only modifications to the factory styling on his 52-C are a custom laminated stock and Swem bedder. It formerly had a custom trigger, but when it became worn was replaced by a 52-C trigger. A Redfield X-tube, Redfield International Receiver Sight, Archie Bell front, Lyman 20-power scope, Davidson 45-angle spotting scope, plus Remington ammo, complete the equipment story. (Vic used Remington ammo for the first time in the 1961 national matches, as he has previously shot Western Mark III.)

Just as all champions employ different combinations, they are also endowed with distinctive personalities. The psychological aspect of shooting has been somewhat neglected in the "How to Shoot" articles; nevertheless, it is not to be overlooked in analyzing the qualities which determine good shooters, for the wrong mental attitude has impeded many a potential champion's rise to the top. This brings us to Vic's "secret weapon," which is simply—self-confidence. (This is our own observation; Vic disclaims having a "secret weapon" and contends that everyone has "butterflies" under pressure). This 23 year-old slow-speaking Californian, not only believes in his ability to win, but is a picture of relaxation. Nothing seems to ruffle him. As a case in point, his shooting equipment was lost by the airline in 1960 when he flew to the nationals, and was delivered to him minutes before he was called on the line for the first match. He placed second in the grand aggregate! He arrived at the 1961 Calif. state matches at Ft. Ord in a taxi with just time enough to put up his target. His car was stranded on the highway 9 miles away with a faulty transmission, but, unperturbed and pulse normal, Vic won the grand aggregate.

He went on to win all three aggregates at the South Pacific Regional and the North Pacific Regional, then captured the prone aggregate at the All Air-Force Championships at Lackland Air Force Base.

Now, after winning the greatest honor of all—the National Championship—and being flown to Philadelphia with special military escort to be honored by the Air Force, Vic has settled down once more to serious studying in UCLA's graduate school. America has had many fine champions, but none more versatile than the present one. Some of his writing has been published, and he is an excellent actor with an exceptionally good singing voice. We hope to see "our" Rifleman on TV soon.

NEW SPEER LOADING MANUAL

The new Speer manual for reloading ammunition (No. 5) is GOOD. It is, in this writer's opinion, a real and desirable improvement over the older Speer manuals.

It is up-to-date—has loading dope for the new cartridges that have been made available recently. The new manual (No. 5) is comprehensive—it includes information and loading data for handgun cartridges and shotgun shells in addition to that for rifle cartridges.

For the rifleman-handloader, loading dope for the more commonly used "Wildcat" cartridges is included with that for the regular commercial factory cartridges.

The new manual is convenient to use—index tabs throughout the book permit the handloader to quickly find the particular data he wants to refer to without time consuming "thumbing-through." It is a good "working-book" for the handloader.

The new No. 5 Speer manual DOES NOT have EVERYTHING in the way of information and loading data for all handloaders. It does not have the dope for some of the wildcat rifle cartridges that is included in the Speer No. 4 manual for Wildcat Cartridges. It does not have loading data for many of the older, so-called obsolete cartridges, both rifle and pistol, that are still around and being reloaded.

Maury Morse, 12, and Jeffery Morse, 10, sons of "Mike" Morse of Miami, Florida, who are believed to be the youngest competitors in the National High Power Rifle matches at Camp Perry in 1961.

The new Speer No. 5 Reloading Manual is a worthwhile and desirable addition to the handloader's reference library, but he needs other manuals and books for the complete information he needs, or thinks he needs.

P. H. T.

A PROPOSED PRACTICE TARGET

We have received the following regarding a practice target for home basement range use from:

Edward H. Lane
960 Marion St.
Denver 18, Colorado

Dear Mr. Teachout:

Being in need of practice, and not being able to go out to the rifle range very often, I have designed a reduction of the 300 meter free rifle target for use at 28 feet. Use of this target would enable many of us to practice in our basements.

I have checked my B&L spotting scope, and find it will focus for this distance. The rifle scope wouldn't quite make it, but I am mainly interested in practicing with iron sights.

Mr. Abe Neiman, of American Target Company, says he can make the target, but would have to sell at least 50,000 of them.

The target would have the following ring diameters:

10—0.102″
9—0.010″
8—0.122″
7—0.234″
6—0.346″
5—0.458″
4—0.570″
3—0.682″
2—0.794″
1—0.906″

Target would be black to the three ring. A ten is a shot which takes all the black out of the eight ring. A nine is a shot which touches the dot.

We will not know the price until we find out about how many might be sold.

(Editor:—If any of you are interested in this target you should write to Mr. Lane at the above address and let him know how many you might want if they are made available.)

SIERRA Expert Rifleman award.

SIERRA BULLETS OFFERS EXPERT AWARDS

"Can you fire a 1-inch, 10-shot group at 100 yds.?" Any shooter who can may qualify for a **Sierra Expert Rifleman Award** and be entitled to receive a bronze cap or lapel Pin (illustrated), a colorful Brassard, and a beautiful Certificate for framing.

In order to qualify shooters must use Sierra Bullets. Any shooting position and any make or caliber of rifle may be used, however, the weight of rifle and 6-power scope may not exceed 10½ lb. Awards close Dec. 31, 1962. Every man, woman and child in the United States is eligible. Everyone who qualifies will receive an award. Sierra Bullets is not limiting the number of awards.

Shooters should get a free entry blank from their dealer before firing their group.

BAHLER 8S .30 CALIBER BULLET DIE

Have made some bullets in the BAHLER DIE SHOP's new .30 caliber 8S bullet swaging die. The slimmer 8S ogive does make a real pretty bullet and for that reason I shall probably make most of my future .30 cal. bullets in that die.

A limited amount of shooting with the 8S bullets in the 150 grain weight range, made in Sierra 1.085" long jackets, seems to bear out my expectation that the 8S bullet would have little if any noticable accuracy superiority over the 6S bullets at the shorter ranges (300 yds. max.) over which many of us do the greater part of our shooting.

It might be expected that the 8S bullet with its slimmer ogive would show some superiority in better retained velocity and less wind drift at the longer ranges (500 yds. and up), especially in the longer and heavier bullets. Will try to find out something about that after getting some of the Kenru Reloading Service "My Special" Sierra jackets in the longer lengths and making some of the longer and heavier bullets—but that "monkeying around" will have to wait for a bit.

PHT

A CARTRIDGE CASE CLEANER

By Harmon L. Remmel

In the current issue (November 1961) of P. S., on page 19, there is a discussion by Q and A concerning the cleaning of cartridge cases.

Over the past few years I have found a very satisfactory liquid with which one can clean brass safely and easily, although a bit on the smelly side.

It is Cities Service Solvent #26, and can usually be purchased from a Cities Service Oil Distributor (not a Filling or Service Station) in varying quantities from one gallon on up, with the usual quantity being five gallons. It runs somewhere in the neighborhood of $1.00 per gallon.

This is expensive if you only have a few cases to clean, but if you are working over old GI brass for reforming into something else, and you want to get rid of all the old encrustations on the inside as well as in the primer pocket, you will find this Solvent #26 to be indispensible.

Also, if you work with old time rifles for which ammo is no longer available and you have to use old cartridges that have been around a long time and the old black powder in them has caked and adhered to the case inner walls, Solvent #26 will bring them out good and clean.

You use it full strength and put enough in a covered glass container to completely cover the brass you wish to clean. You leave this dirty cartridge brass in the Solvent #26 **overnite**, and then pour off the cleaner (SAVE IT, DO NOT THROW IT AWAY) and then you wash the brass in the sink, or some suitable container, using one of the usual kitchen detergents such as ALL or its equivalent. Then rinse in hot water, drain and either allow to air dry or put in a pan in an oven **not hotter** than 200 degrees and leave until all traces of moisture are gone.

Your brass will be clean, BUT it will be dull and not shiny. There will be no deposits of any kind in it or on it anywhere and it will work through forming dies very smoothly with an absolute minimum of case lubricant. The Solvent #26 can be used over and over until it gradually loses strength and this is noted by its not cleaning well. Then is the time to dispose of it. It has a pungent odor, but is not at all unpleasant. One caution: DO NOT use with copper!

TOURNAMENT CIRCUIT

HILL DEFEATS AUER IN PACIFIC STATES FALL ROUND-UP

By Betty Summerall Duncan

It was a smoggy day in Angel Town when the nation's two top shooters, 1960 Olympic silver medal winner Gunnery Sgt. James E. Hill, USMC, and National Champion Victor L. Auer battled it out for the first lap of the annual Pacific States Fall Round-Up Smallbore Rifle Tournament November 4-5 on the Los Angeles Rifle and Revolver Club range.

Hill let it be known in the opening Dewar metallic that he meant business with a winning 400-35x, and continued his pace with a 400-32x for the 100 yd. trophy. Auer cleaned the 50-meter, 400-31x over second-place Hill's 399-31x. Hill regained the winner's spot at 50 yds., tallying a 400-37x.

With perhaps the finest array of shooting talent, outside of the Nationals, congregated—159 strong—none were able to deter the victory march of champions Hill and Auer as Hill's 1599-135x swept the field for the Metallic Sight Aggregate, followed by Auer's 1598-121x. Hampered by an unusually heavy smog, light conditions constantly changing from a hazy sunshine to dark creating poor visibility, in addition to gusty winds, the prevailing factors were hardly conducive to the superb calibre of metallic sight shooting which these scores indicate.

Other Metallic Sight Aggregate Winners:

Clifford Pierson, Sun Valley	1597-102x
Robert Boydston, San Gabriel	1596-123x
William J. Grater, Camarillo	1594-104x
A. R. Willbrandt, Montebello	1594-100x

The smog was a bit less offensive on the second day of firing as a Santa Ana wind condition blew hot air in from the desert. Many competitors who were thrown out of the running in the metallic sight matches due to allergic reactions to the previously mentioned "score-wrecker" redoubled their efforts with the glass. William Atkinson, Prescott, Arizona, shooting his own Atkinson-Marquart barrel, Creedmoored Hill and Henry Benson, NRA Director from Salmon, Idaho, with a 400-36x

(Continued on Page Fourteen)

SMALL-BORE RIFLE IN GREAT BRITAIN

In its Diamond Jubilee Year, for it was founded in 1901, the National Small-bore Rifle Association has celebrated a truly record Summer Season.

Entries for the three National Prize Meetings have exceeded all previous records. At Bisley almost 1850 competitors were listed at the commencement of the meeting for small-bore rifles, mainly in the prone position but with a growing section for positional shooters.

The Scottish "Bisley" attracted nearly 600 competitors, whilst the National Pistol Meeting at Bisley during the August Bank Holiday weekend had almost 350 competitors.

The official scores for the Lord Dewar International Trophy Match are:

Great Britain	7790
United States of America	7681
South Africa	7666
Canada	7606
Australia	7573
New Zealand	7501

SOME PROBLEMS IN RELOADING THE .303 MK VII WITH BERDAN PRIMERS

By Dr. B. J. King

European and British rifle ammunition, except that made by Norma for export to the United States, is customarily loaded with Berdan primers. This creates certain problems for the handloader, and the author discusses these problems in relation to the .303 Mk VII cartridge.

First, why use Berdan primed ammunition at all? The answer is—economy. In England it is customary for fired military ammunition i. e. cartridge cases, to be sold as scrap brass. Reloading of cases is almost unheard of, so that there is no market at all for these cases to be used in reloading. Scrap brass fetches about one shilling (14c) per pound, there being about 40. 303 cases per pound. For the sum of ten shillings ($1.40) a reloader can get himself a supply of good brass. In addition to the extreme cheapness of the brass, the cases have another advantage over U. S. commercial brass with Boxer primers; this is in the thickness of the case; since in a series of tests, no American brass could be found as thick or thicker than that of British military .303 Mk VII.

All British military ammunition has crimped primers. The crimp is of the circumferential type, and depending upon the batch of ammunition, may make extraction of the Berdan primer very difficult. In the writer's experience, Govt. ammunition stamped RG always has a deep crimp; while that with a base stamp GB (Greenwood & Batley, Leeds) has a much shallower crimping ring. Govt. ammunition, and much of the commercial ammunition (e. g. by Kynoch), is loaded with mercuric corrosive primers. These are excellent primers from the point of view of ignition and storage, but present problems to the handloader. The mercury in the primers is sufficient to weaken the brass case, so that some batches of ammunition are so brittle, that the neck can be snapped between thumb and forefinger. RG headstamped cases are consistently brittle, and the writer has never been able to reload these. On the other hand, GB headstamps are consistently good cases from one batch to another, and these shells have been reloaded many times to maximum pressures without signs of case failure. Kynoch (Govt. contract) ammunition likewise seems very good, even though it has been once fired with a mercury primer. Cases headstamped RL (Royal Laboratory) seem to fall somewhere between RG and K, and are apparently perfectly all right if one stays away from maximum loadings. It is impossible to tell without testing which batch of cases is safe, but some test loads on samples seem to reflect the state of the whole batch fairly accurately. Hence whenever using these cases, always run some test loads gradually working up the charges. Some Kynoch ammunition is loaded with NMNC primers, and these are obtainable from the Kynoch dealers. However, to the best of the writers knowledge no military ammunition has ever been loaded with NMNC primers. Some of the best military ammunition ever producer, base stamped CP 44 (Crompton Parkinson) is particularly bad for brittle necks and split cases on reloading, and this is as consistently bad as GB is consistently good.

Before removing the Berdan primer it is best to full length resize and then neck expand some cases from each batch. Any batches where the necks split with the expander nipple are quite useless. This quick test eliminates the delay in depriming and repriming only to find on case sizing that the case is no good anyway. Hence, with all batches of ammunition, stay away from R. G., and CP headstamps; try if possible to get GB or K headstamps; and always run a sizing and expanding test as a preliminary to reloading. With cases at 14¢ per pound this is quite economical.

Removing Berdan primers requires a Berdan decapper. Some reloaders use a tool resembling a miniature ice pick with a chisel edge ground onto the tip. This is placed obliquely against the side of the primer, and a sharp blow from a small hammer drives the point laterally into the primer, which can then be levered out with some difficulty. The method is clumsy, tends to damage the primer pockets; is difficult with a deep crimp, and cannot be used with live primers. The method is mentioned only to condemn it.

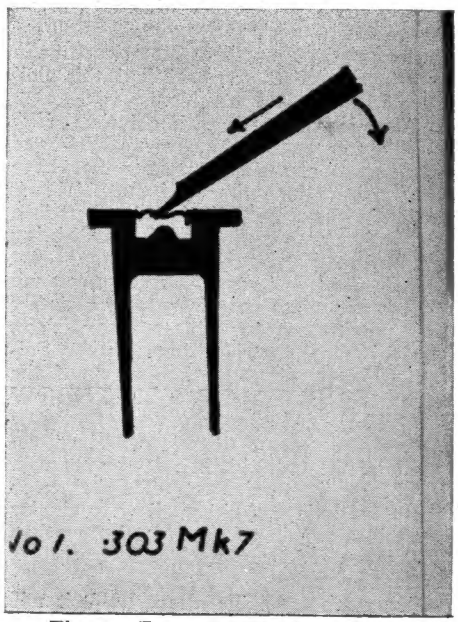

Fig. 1. Removing Berdan primer with modified ice pick or small chisel.

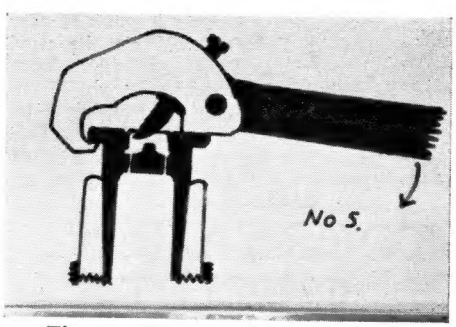

Fig. 5. Illustrates how the NORMA deprimer is used to lever out both fired and unfired Berdan primers.

Far better is the method using the NORMA Berdan decapper (fig. 5), which is adjustable to all sizes of case head and size of primer, and works very well indeed with Boxer primers. The principle of the machine is to drive a short bevelled chisel into the side of the primer, and then use the lever to lift the primer smoothly from the primer pocket. The designers have obviously never had to deprime many .303 Mk VII, because 'as made' the machine is very efficient at bruising and skinning the backs of the index and middle fingers of the right hand. The fault lies in the short handle, and is easily remedied by using a piece of aluminum tubing to extend the handle, and thus keep the knuckles and fingers away from the carrtidge case. In addition, the case is held very clumsily, a short handle with a metal rod attached is provided, the rod being inserted into the case neck, while the deprimer is used in the other hand. The effect of the rod (smaller than the case neck) is to distort the neck markedly, sometimes splitting it when the primer is crimped in tightly.

A far better way to hold the case is to take the .303 seating die, and screw this upside down into a C press, so that the case may be dropped vertically in to the mouth of the die (Fig. 3). Using the deprimer now results in the lateral strain being taken up by the whole of the case wall, and there is no distortion of the case at all; the method is definitely quicker, and is extremely easy, it being possible to deprime as fast as with the more familiar Boxer primer.

The chisel of the Berdan decapper is adjustable for protrusion by a small threaded screw on top of the handle. This requires careful adjustment, so on no account must the centrally placed anvil be damaged while extracting the primer. Damage to the anvil leads to delayed or faulty ignition, and any cases damaged in this way should be rejected, or kept in a separate batch for use as 'barrel warmers' on the target range. With care however, and with the decapper correctly adjusted, it is possible to deprime at a considerable speed, without damage to knuckles, or to the cartridge anvils.

So much for cartridge case selection, testing, and depriming. As mentioned earlier, the Govt. ammunition has a primer crimp of varying depth. This **may** need to be removed, and can easily be tested as follows. Place a few Berdan primers on a flat board, with their concavities facing upwards, and press the case head over the primer. If the case picks up the primer, the crimp does not need removing; if it fails to pick up the primer, proceed to the next stage,—crimp **removal.**

For a small batch of cases, it is sufficient to use a small penknife blade to remove a fine shim of brass from the crimp edge until the case will **just pick up** the primer as tested above. However, a lot of cases will make the fingers very sore, and soon dulls the knife, so that it is easier and quicker to proceed as follows. Take a **wood** countersink drill with two cutting edges, and a 90° angle (Fig. 2), and grind off the point **flat,** so that when the drill is turned in the primer mouth, and has removed just sufficient brass to allow the primer to enter the pocket, the flat tip **abuts against the anvil** (Fig. 4). The depth of drilling therefore depends upon the anvil being undamaged, another reason for **being careful** in decapping. A lathe, or vertical drill, or hand drill may be used for this purpose. If a machinists drill is used, it is but a seconds work to reverse the case, and chamfer the inside of the neck, so that primer pocket crimp and inside neck chamfering can be accomplished on the same drill stand.

It now only remains to clean the primer pockets thoroughly with a piece of rag and a small screw driver, and prick **(never drill)** the flash holes with a fine needle to ensure there are no fine brass turnings to obstruct the primer flash. Those reloaders who have live unfired Govt. ammunition may wish to break this down for components. With the powder and bullet removed, the live primer may be extracted using the NORMA deprimer, a procedure which is quite unsafe using the modified icepick. The primer pockets may then be treated as above, and the brass used, knowing it has never been subjected to mercuric primers.

Primers are manufactured by many companies, including I. C. I. Kynoch (England), Fiocchi (Italy), RWS (West Germany) and NORMA (Sweden). It is important to select non mercuric, non corrosive types, and the four companies above can provide these, although it is very difficult to obtain Kynoch primers in the Unit-

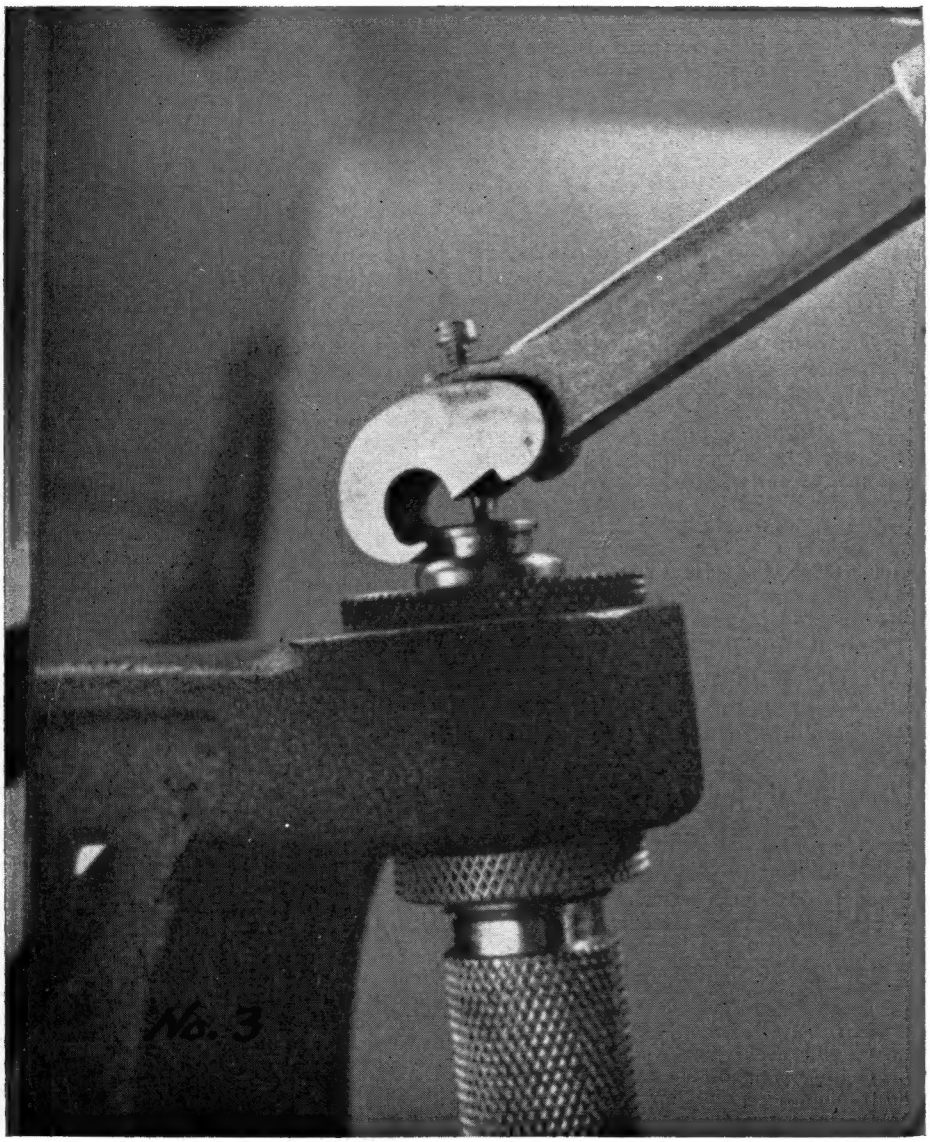

Fig. 3. .303 Berdan primed (fired) case held by sizing die screwed upside down into C press. The NORMA deprimer is illustrated about to pierce the Berdan primer.

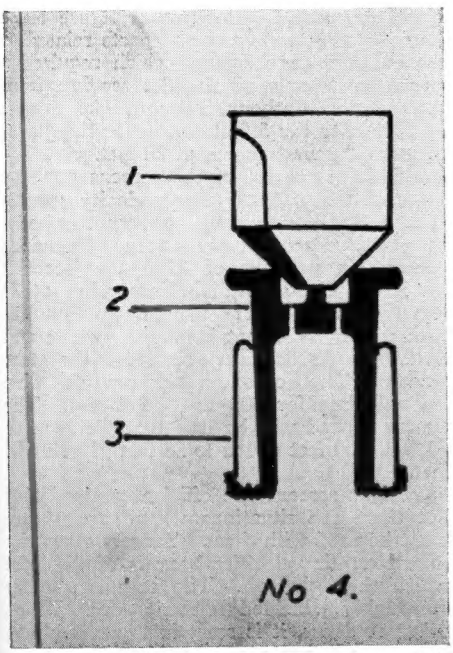

Fig. 4. Section through .303 case held in upside down sizing die. (1) Countersink drill with point ground flat enters as far as the top of the anvil; note 45° chamfer on the primer crimp of the case. (2) .303 deprimed case. (3) .303 sizing die upside down in the C press.

ed States. The writer has experience only of RWS manufactured primers. The correct size of primer for the .303 Mk VII is one of .248" diameter corresponding to the RWS #6000. Some handloaders have been using the .254" diameter primer, forcing this into the primer pocket. Specimens examined by the writer of the Fiocchi .254" primer show it to be constructed of much thinner metal than the RWS which is of much more robust construction. While the .254" is suitable and correct for some of the English black powder Express cartridges, it is definitely unsafe and incorrect for the .303 British, there being reports of ruptured primers, and blowbacks with standard reloads. This is not to imply that Fiocchi primers are unsafe; they also make a .248" Berdan primer which is perfectly suitable for reloading.

Seating the primers presents problems especially with the Lyman 310 hand tool, and also with bench tools fitted only with primer arms for large rifle primers. When the writer first started to reload these cases, he placed the primer on top of the .210 priming arm, and attempted to seat the primer just as he would the regular .210" large rifle primers. The result was a series of failures, with the primers only partially seated, it not being possible to remove the primer or the cartridge case from the bench press. The case holder complete with partly primed case had to be removed from the tool, and the case sawn off, and the primer

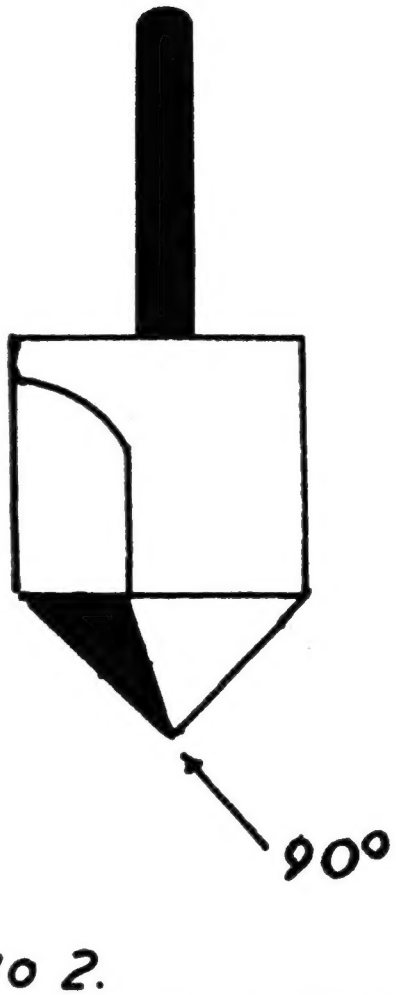

Fig. 2. 90° wood countersink drill with two cutting edges, 5/8 inch diameter.

drilled out carefully from the anvil side. The next attempt to seat these primers was to place the seating die upside down in the press, and drop the case into the die, with a small ¼" long washer slipped over the base of the case. This prevented the case shoulder abutting against the shoulder of the seating die. The primer was then placed over the primer pocket, and two sharp blows given with a light flat headed hammer. This seated the primer absolutely flush with the case head; some 600 cases were reprimed this way, with no primer explosions, as the primer was never driven below the level of the case head to contact the anvil. However, although the cases shot very well, there were occasional misfires attributed to damage to the priming mixture.

It was obvious that the priming arm required modification. Rather than manufacture a new priming arm of larger diameter for the .248" primer, and drill out the shell holder to permit the larger diameter arm to pass through (requiring a separate shell holder for Berdan primers), it was found far easier to proceed as follows.

A 9.5x57 mm Mannlicher Schoenauer die, or 30/06, or the .303 **seating** die, was screwed correctly into the bench press. In the case of the 9.5mm and 30/06 dies, a .303 case will enter as far as the **rim**; with the .303 die, it is necessary to use a ¼" washer again to prevent the case shoulders abutting against the die shoulders. Either way, the .303 case can travel only as far as its **rim**. Using Herters dies, the depriming arm of the .303 sizer die (or any die for that matter) is removed, and the expander nipple unscrewed. The end of the depriming arm is then dropped into the top of the .303 shell

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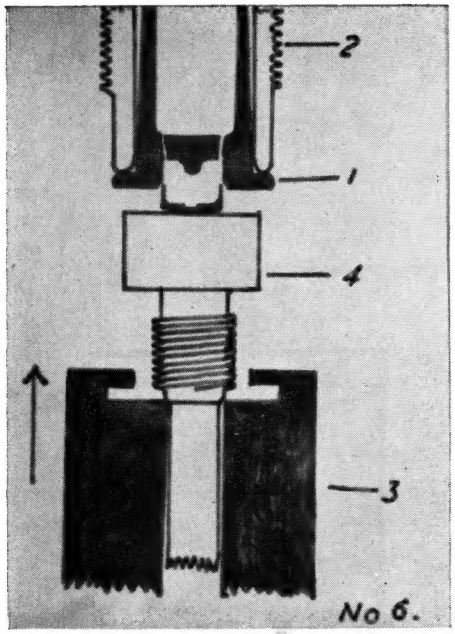

Fig. 6. (1) Empty, deprimed but unsized .303 case in (2) .30-06, 9.5m/m sizing die; .303 seater die can be used with a ¼ inch washer slipped over the case. (3) Ram of C press, with flat topped punch—(4)—in this case the expander arm from the .303 sizer die. Any flat piece of metal will do.

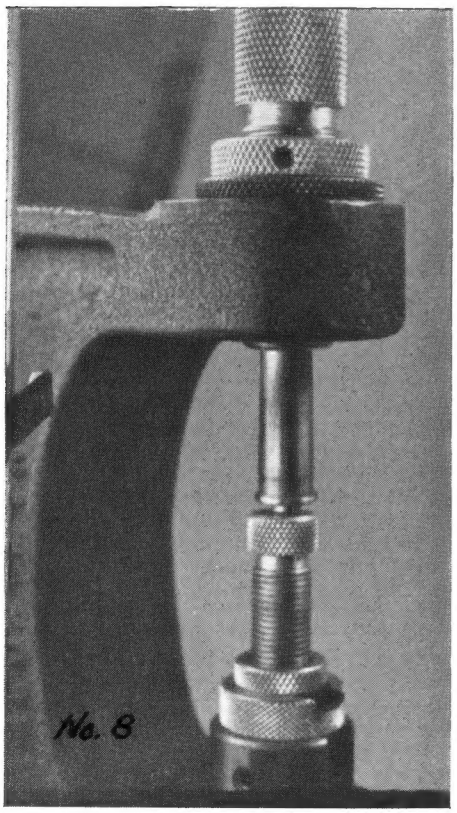

Fig. 8. Photograph of the ram of the C press, with punch inserted; on top of the punch is the RWS primer. As the ram rises, the .303 rim is held against the rim of the .30-06 die above, and the punch pushes the primer flush with the top of the case rim. All stages of primer seating are visible and easily controlled.

Problems In Reloading The .303 Mk VII

(Continued from Page Five)

holder, until it comes to rest against the metal adjoining the upper screw thread (see drawing) (Fig. 6). This provides a flat topped piece of steel attached to the ram of the tool. (A machinist could easily turn a similarly shaped piece of metal, as e. g. RCBS dies do not have this flat top.) In order to prime a case, the primer pocket is pressed over a primer to pick it up, and the case and primer held over the flat top, while the ram is lifted (Fig. 8). The case is driven into the 9.5mm or .303 die (don't forget the washer here), until the rim connects, whereupon the flat top drives the primer into the pocket absolutely flush with the case head, its progress being visible at all times. Lowering the ram allows the case to fall out--with the 9.5mm dies, repriming is faster using this method than it is repriming Boxer cases without an automatic primer arm.

The case should not be resized until it has been reprimed; but at this stage it can be treated as one would a primed but unsized Boxer case.

Once these cases have been fired a second time, reloading is very much easier; the lack of crimp allows the primers to pop out very easily, and there are no crimps to remove by drilling. Care must still be taken however not to damage the anvils.

Loading data for the .303 cases may need to be reduced slightly. The capacity of a full size Kynoch case used for their Streamline ammunition was 44.0 grns of 4831. Seating a 165 gr boattail into this case compressed the powder. Other cases of increasing capacity were (in order), GB54, GB53, GB56, K55, K56, RG56, RL54, (English), DCC 54 (Canadian), WRA 44, WRA 43, and Remington commercial (American). The latter held 48 grns of 4831, and these cases **failed** after several maximum reloads, whereas the military GB54 is still going strong.

In spite of the snags of reloading, the Berdan primed cases are just as good as Boxer cases of US manufacture. They are infinitely cheaper to acquire, and they seem considerably stronger (in terms of brass) than their Boxer counterparts. The only additional tools required for their reloading are the NORMA deprimer, and a ¼" washer to slip over the .303 base. With rimless Berdan cases in other calibers, slight modifications are required to the procedures outlined above. Thus, there is no rim to prevent the case entering the die during priming, and all that is needed is a thin steel plate with a slot cut in it to slip into the extractor groove, the steel plate serving the place of the rim on the .303.

CHRONOGRAPHS
by Fred Hallberg

Amateur use of chronographs for determining bullet velocities is increasing rapidly and it may be of interest to offer some brief notes concerning the equipment used for such work by the larger arsenals.

Personally, I am very much sold on what is probably the most expensive chronograph system available on the market today, namely the Potter. Some eight or ten years ago when I used that system, the cost complete was in the neighborhood of $800. Today that figure would probably only be a modest down payment. This was the chronograph that was most widely used by Government arsenals. Here and there other makes made their appearance but the equipment most commonly used was the Potter.

A chronograph system consisted of a chronograph (a recorder) and two screens. Screens are so called because they present a surface through which the bullet must pass to record its velocity. Screens may be of two kinds: (1) a simple beam of light or (2) a double layer of wire cloth (window screen) separated by a thin layer of electrical insulating paper. Screens forming a magnetic field and commonly used for the larger projectiles such as the 20 m/m and up will not be considered here.

Normally, a light screen will be used with the Potter chronograph. Such screens are particularly effective and easy to work with when the range is in a darkened tunnel such as is available to the larger manufacturing arsenals. Once such screens are properly placed relative to the flight of the bullet, they can be used for quite rapid rates of fire without further adjustment. The great advantage of a light screen is that you can constantly see through it and note the pattern created at the terminal or backstop. Such observation enables you to properly place the bullet relative to the most sensitive point of the light beam.

A light screen usually consists of a triangular shaped frame, inverted with the wide part at the top and the point at the bottom. Long tubular bulbs are located at the top and provide the light source. The point is a flat metal box containing an electric eye activated through a narrow slot. When the bullet and the air disturbance surrounding it passes through the light beam, the electric eye notes the disturbance and instantly alerts the recorder.

Two screens are required for each chronograph. Screen number one is placed 28 feet from the muzzle. Screen number two is placed 100 feet from screen number one or 128 feet from the muzzle. Change the position of either screen one inch and you have a definite error in the recorded velocity. Shorter distances between can be used but, as you reduce the distance, you increase the error. It is interesting to note that one of our largest commercial ammunition companies uses a very short range.

Since the screens are placed 100 feet apart, the chronograph records the elapsed time for 100 feet of flight. Passage of the bullet through screen number one starts the chronograph ticking off particles of time, each of which is one one-hundred thousandth of a second. Passage through the second screen stops the chronograph. The elapsed, or accumulated, time is noted by the operator and, by means of a scale, he converts it into foot-seconds.

In order to avoid the effect of muzzle flash and shock waves, it is necessary that the first screen be placed some distance from the muzzle. The precise figure of 28 feet used here is in some respects related to the old Boulenge system which required a circuit breaking wire placed three feet from the muzzle. Mathematical convenience added 25 feet to the 3 feet and hence the placement of the first screen at 28 feet.

This placement of the screens explains some of the odd sounding velocity specifications that accompany government ammunition. For instance, Army Ordnance specifies a velocity of 2740 foot/seconds for its .30 Caliber Ball M2 cartridge at 78 feet. Why 78 feet? We know that the first screen is 28 feet from the muzzle and that there is 100 feet between the two screens. The chronograph records the elapsed time for 100 feet of flight. The average speed will be half that distance or 50 feet. 50 feet added to 28 feet gives us 78 feet.

Light screens are efficient and reliable but there are situations when special care must be used with them. Tracers often can record erratic velocities because of the light which they give off. The cure is a more thoroughly shielded electric eye. When firing outdoors, it is sometimes advisable to invert the triangle so that the electric eye is at the top instead of the bottom and so protected from too much natural light.

Light screens are very practical for determining muzzle or near muzzle velocities. However, when it is necessary to record actual elapsed time over greater distances, say

600 yards, it is better to dispense entirely with light screen number two and substitute something larger.

Our first attempt to create a screen for distance firing resulted in an assembly of the two layers wire screen described above. This worked very well and there was enough natural dispersion in the bullet group to eliminate the likelihood of a second bullet centering in a previous bullet hole. However, the assembly of such screens was tedious and troublesome and I hit upon the idea of adapting some of Sears Roebuck's inexpensive and readily available insulating material. This was a roll of thin tar paper coated on each side with aluminum foil. When the bullet passed through the sheet it contacted both surfaces and closed the necessary circuit. If a particle of aluminum remained to keep the circuit closed it was only necessary to send a heavier surge of current through the circuit to burn out the offending particle in the manner of blowing a fuse.

Incidentally, why doesn't someone build a self-recording target by using the insulating material and the method described above? It is very simple. Transfer the rings from the target to the foil and remove the foil under the rings. Then hook up each scoring circle with a numbering or lighting system at the firing point. If a bullet strikes so as to just touch the higher scoring circle it will score both numbers but in such a case you recognize the higher number only. Or if you are really good at electronics, you can wire the system so that only the higher number will show. Thin foil strips attached with masking tape form the contacts and more than one should radiate from each circle so that if one is shot out you will not have to immediately run down to the pits to replace it. Let's hear a report on that self-recording target soon.

The above is very practical with large ringed targets such as the 200 yard "A" target. It is not practical for a many-ringed target. For a target with narrow scoring rings, a television system is best. I have seen such a system operate and it produced a lot of spectator interest. The camera faced the target at an angle from one side where it was protected with armour plate. The picture appeared on a screen at the firing point. Each shot was clearly reproduced on the screen for all to see.

Many new interesting and time saving procedures were developed while in ballistics at Twin Cities Arsenal but when the Arsenal closed much of it was destroyed and lost. I suppose it will ever be thus with government institutions.

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6 M/M EXPERIENCE AND COMMENT

Dear Phil:

Thought I had better drop you a line for P. S. about the 6.5 x 300 Wby. that I had written about in the last July issue. This created more comments, both pro and con, of anything I have yet submitted and I am still getting correspondence on it. To bring this up to date, almost everyone was very interested to know what the true muzzle velocity was with the 139 gr. Norma Match. I chronographed several loads. My pet load that I used in my state match and at Camp Perry was far short of the near 4000 ft. as I had estimated. However, one load did give me 3600 M. V. (3593 Instrumental), but it had too much pressure to be practical. I had based my conclusions on the fact that my elevation from 200 yd. zero to 1000 was 17½ minutes in my 27" barrel. As any 1000 yd. target shooter knows, this is considerable less than any of the big 300 magnums. When finishing a relay at Perry I would inquire of others as to windage they used; and if they had 4½ minutes right or left, I would have three. My sight is a Unertl 1½" and bases are the standard distance apart. My minutes check out perfectly at 100 yds., 40 clicks or 10 minutes will move impact area 10 inches. So with the above conclusions one can see why I was pleased with performance and why I thought I had such high velocities.

In my case as well as the 264 Winchester, I find Hodgdon's H870 ball powder very cool burning and it gives very good results with heavier bullets. Some of my friends may be wondering what I did at Perry. Maybe I should just keep quiet, as no one loves an alibi. In Wimbledon I shot a 4 on third shot for record and saved the other 17 shots. In the 1000 yd. iron sight Leech Match I shot a 100 with fairly low V count but good enough to be highest in my category on that relay, so I won a silver spoon and a place in the shoot off. What happened in finals I am not too sure, but 1st record was a high V right on line and I thought I cranked down on sight. Anyway I shot a 4 at 12, one of those hard luck ones just out. I decided to go on and finish just to see what the gun would do. I finished with 99-15V.

In one recent P. S. 6.5 article I read where the 300 magnum case was too big and also that the 77 gr. bullet was too light to build up pressure for velocity in a 6.5 x 280. I tried it out in my big case. I couldn't get but 99 grains in of H870 which gave 4212 so I went to a duplex load of 15 gr. 4895 as a sort of booster charge with 82 gr. H870 which really sent the little bullet on its way at 4344. The same man who complained the 77 gr. bullet was too light in his 6.5 x 280 and his 58 gr. of 4831 only gave 3418 while 58.5 gr. 4350 with 109 gr. bullet gave 3680. I wonder why he didn't use a faster powder like 4064 or 4320 and build up a load with desired pressures? I am sure he could attain a M. V. of around 4000 with the 77 gr. bullet. Besides saying the 300 magnum was too big he states the 264 Win. was a big disappointment. I wonder if he has tried H870 powder and heavy bullets with either the 264 Win. or 300 Mag. necked to 6.5 or ,if he even owns one. The same writer speaks of his 6.5 x 280 (I have one of these too) and complains of a problem in getting Match grade bullets. For me they all shoot good, but for 1000 yd. target shooting there is just one, the 139 gr. Norma Match. A good barrel is a necessity with nothing slower than a 9" twist. Most of the Europeans use a 7½" twist for the 6.5 x 54 and 6.5 x 55. The writer gets back on the barrel vibration business and tells that with three Timken 17-22 A barrels by Douglas, that all three did not settle down and start shooting until they had 200 to 300 rounds through them. He states this should be of interest to me sinde I was going to get a barrel of this steel for my 6.5 x 300 Wby. Well I did and it started shooting right off. Maybe it only needed one shot from my cannon to settle all that "stress, relief, strain, etc." Anyway I have a 30-06 target rifle in that steel and it shoots good—starting good with 1st test firing. Joe A. Deckert, my shooting partner and 1958 World Champion on the double running deer and the 1st man to shoot a 250 in an NRA registered N. M. course match, has the twin to my 30-06 Timken barrel. His action is glass bedded, (action and 1" of barrel glassed, balance of barrel completely free). He had no trouble from start with accuracy. The writer I refer to also wanted the whole wide world to know he was for Harvey Donaldson. He mentions it twice in his last letter. I don't know what all this was for, but for that matter, I think we all like Harvey.

One classic I hate to overlook was another letter in October P. S. with the title "The 6.5 Myth." The writer evidently converts an old 256 Buffalo Newton with 10" twist to a 6.5 x 54 M-S and proceeds to shoot 160 gr. bullets, which keyholes as expected at 100 yards. Now the real clincher which entitles him to use the word Myth comes in his following statement: "My test firing confirmed that bullets keyholed at 100 yards. But they stabilized out yonder and I could hit rocks at 400 yards without trouble." Now what supernatural power is going to grab these tumbling bullets at 100 yards, straighten them out with an additional spin so they will hit head on at 400 yards? Of course he could still be right; he didn't say how big his New Jersey rocks are. If they are as big as some of our New Mexico variety he could hit them with a sling shot. Another comment the "Myth" author makes referring to 160 gr. 6.5 bullet is: "In my book (and I can prove it) 160 gr .is too much lead even in a Magnum with M. G. powder. It is way over bore capacity ---." I went right out and busted this bubble. I took some 160 gr. Hornady bullets, loaded them with 83 gr. of the M. G. (5010) powder in my 6.5 x 300 Wby. and churned up 3222 M. V. They are not only accurate at all game ranges but they travel head on from my 9" twist barrel. All one has to do is give it enough R. P. M. twist. That's why most of the European gun makers give it 7½" twist.

In closing on the 6.5 I will add several serious comments:

1. All velocity readings herein were made by B. E. Hodgdon.

2. While I mentioned duplexing a load, I will not recommend it. Duplexing does seem to serve a purpose and works out very nicely under some circumstances when needed. **There are also some who would blow their head off with it too.**

3. While I like the 6.5 line of bullets and will continue using them, most of us have heard enough of it. If you have waded through this far you will no doubt be relieved to know this is probably my last contribution to it.

4. My 1st love is the 30-06. Another, but slightly overlooked, cartridge is the 7 x 51, one of the oldest bottle necked sporting cartridges we have and still one of the best, if not the best for efficiency and light recoil. This lack of heavy recoil is not another "Myth." For example, take a Speer 130 gr. 7 mm. bullet, load it to 270 velocity, which can be done with 4320 powder. (I don't usually do it but for sake of example.) Then take a standard 270 rifle and 130 gr. bullet, all other things equal, weight of rifle, length of barrel, weight of bullet and velocity. One would think both should have same recoil but they don't. The 7 x 57 is more efficient in burning less powder by about 10 grains. This approximate 10 grains of powder, when converted to gas, adds to the recoil thrust. This may raise an argument, but should anyone doubt it, ask any competent ballistics engineer. I am now building a light weight little 7 x 57 hunting rifle on a Mexican Mauser action of the "98" type. This action was designed especially for this cartridge; but then, all this is another story.

Sincerely,

Paul Wright
P. O. Box 553
Silver City, New Mexico

.22 HORNET v. K-HORNET

Here's the Low Down on these two Little Varminters

THE .22 HORNET appeared in 1930 as the result of, and in response to the yearnings for a better varmint load than was then available. It is basically an improved loading of the old .22 W. C. F., but uses a heavier case with thicker rim to prevent its use in the older guns. Driving 45 grain bullets at 2450 F.p.s. originally, it was a big improvement over previous small bore varmint cartridges. It was ideally suited to New England woodchuck hunting, and immediately became popular. It provided a flat trajectory for 150 yard small game shots, and bullet expansion and blow-up at these ranges. Good as it was, the Hornet had a limit, and some shooters wanted more.

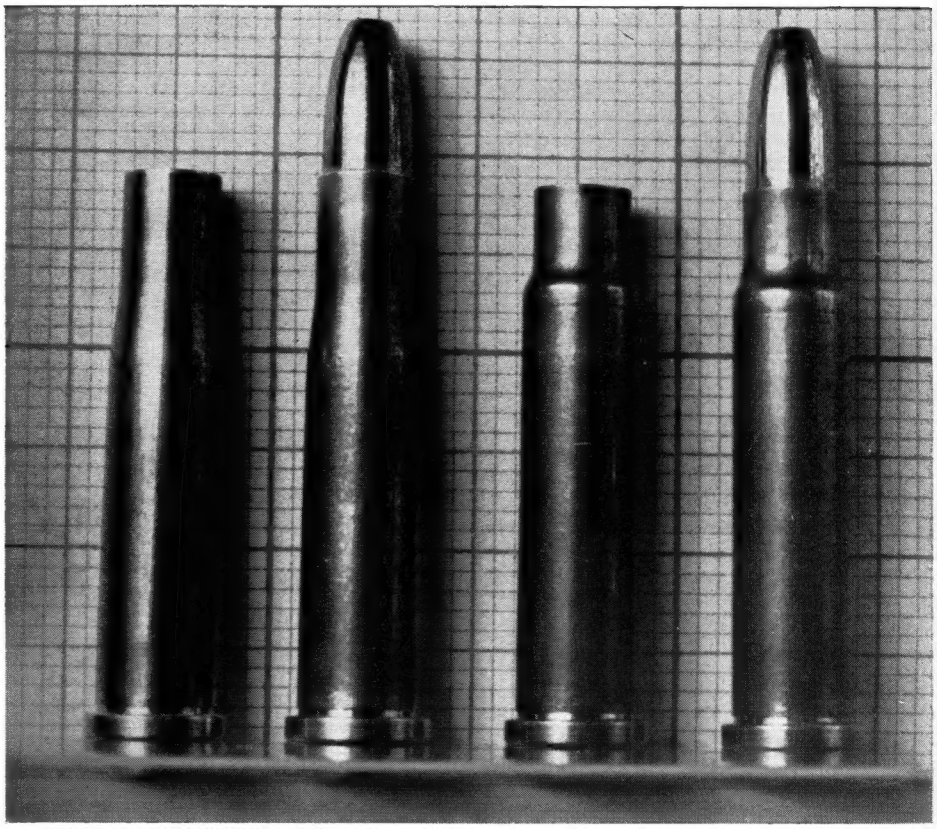
In the quest for greater velocity, larger capacity cartridges were developed, and then Kilbourn blew out the Hornet to his now famous K shoulder, starting a wildcat system. This was the first step in a series of "improved" cases made by the simple expediant of blowing out a factory round (by firing it in an enlarged chamber). The K-Hornet is most likely the best known of these, and may also be thought the best of them. It gained a great following because of the higher velocities possible, and claimed for it. Some of the reported ballistics seemed to be exaggerated, as it was represented as delivering as much as did some larger cases. Controversy over the degree of improvement it achieved has gone on until the present day.

Amazing claims have been made for the velocity of some loads in the K-Hornet, both as regards absolute speed, and in comparison with the regular cartridge. Often the same powder load and the same bullet have been reported in the handbooks as giving much more velocity from the K-Hornet case than from the regular shell. A specific instance of this in the No. 40 Lyman Handbook shows a charge of 11.0 grains of 4227 pushing a 45 grain jacketed bullet 2560 F.p.s. in the standard case, while the same load is listed as 2844 F.p.s. for the K version, despite its greater volume. Other instances of this can be found.

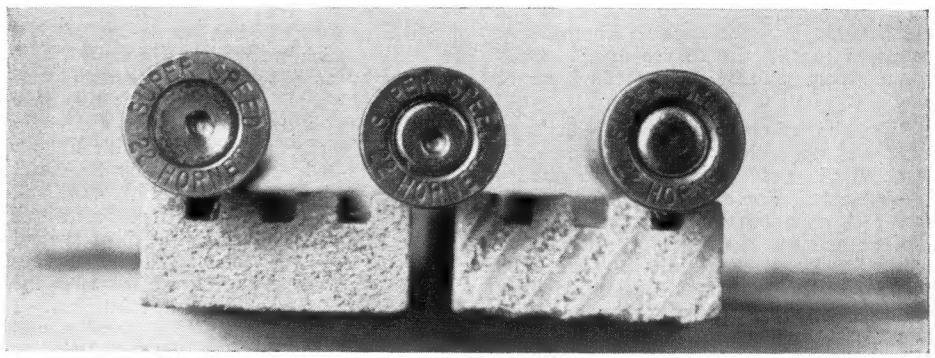
At the same time, this improved, blown out, .22 W. C. F. is represented as equalling the velocity of the .22 Lovell 2R with two grains less powder, and outperforming the .218 Bee, another case larger than it, with the same charge. It would seem, after reading this info, that this K stuff will outshoot both larger and smaller cases with equal ease, using the same or smaller powder charges. This is pretty fancy firing, and we wanted to know if these figures could be true, especially the comparisons to the regular Hornet.

Let us admit, right now, that some of the K-Hornet claims seemed downright out of order to us. The many loads of the same powder in both cartridges that reported much higher velocity in the K, just did not seem right or logical. The general rule for all calbiers is that the bigger the case, the greater its potential, but at a decreasing rate of return. Why, then, should this little hull be an exception? Why should this larger capacity case give more velocity for the same charge? We didn't believe it.

We know that there are many examples of claimed superiority for cartridges which differ in shape or minor capacity increments as compared to other similar ones. But, we also know, there are few instances where even a poor case can be made out in support of such contentions. By and large, any cartridge performs in proportion to its volume, and not out of proportion to it. A big case will out-velocity a small one. There is no way around this.



THE .22 HORNET at left and .22 K-Hornet at right shown against a 1/20 inch grid. The straighter side and sharp shoulder of the K version add nine percent to cartridge capacity, but nothing to efficiency or improved combustion. Note the tabulation of chronographed loads.



.22 K-HORNET PRIMERS for normal and high pressure loads. Left cartridge shows what happens when a tenth of a grain or two over maximum is loaded. Primers will puncture, and entire primer heads will blow out. Believe it, those top loads are tops. At center and right are a normal fired primer and an unfired one for comparison. Even these little cases can generate destructive pressures.

Of course it is true that a small case will deliver more F.p.s. **per grain** of powder than will a larger one. Carried to the extreme, any BB Cap will produce a lot of velocity with no powder charge (as we mean it) at all, or, in effect, it has an infinitely high efficiency. Nonetheless, in that same caliber, it can never equal any larger case with a full powder charge in it. There is no magic about that.

Relating this to our present problem, then, The K-Hornet might be expected to yield a nine percent improvement over the standard factory cartridge, because it has that much more powder capacity in its expanded shape. What we will find out is whether this agrees with the facts, or not.

Here are the Statistics:

A Winchester Super Speed Hornet case holds: 12.1 grains Ball C .0482 cc

Winchester SS case formed to K-Hornet holds: 13.2 grains Ball C .0535 cc

This is a nine percent difference:—9%

Bear this in mind as we pursue our tests of the two cartridges, to see if this is, indeed, the controlling factor.

Two rifles were available, both of them the property of and built by Chris Helbig, a standard Hornet and a K-Hornet. They were close enough to be considered equivalents. These are the guns used in these tsets. Here is how they measured:

.22 Hornet—Winchester SS Action
24¾ in bbl.—.2228 Groove, .2175 Bore, d. in ins.
6—.030″ Lands, 1-16″ Twist

K-Hornet—Suhl Single Shot
26¼″ bbl.—.2231 Groove, .2185 d. in ins. Bore
6—.045″ Lands, 1-16″ Twist

Du Pont 4227 and Hercules No. 2400 powders were used for our tests. H240 was also tried. But since not much data is available for it, to compare to previous results, our comparisons will be based primarily on these first two propellants. Someone may question the omission of 4198, or some other bangstuff. This is not from prejudice. We wish simply to have

our tests relate to the most common experience in these calibers, and the bulk of available data is for the two powders used. H240 offers some advantage in this as well as other small capacity cases, but it does not alter our conclusions one bit. H240 takes to the standard Hornet, but not too well to the K. 4198 is too slow for the best results in either of them.

In these two guns, a variety of loads were fired. Similar charges of the same

HERE ARE THE CHRONOGRAPH TEST FIGURES

All Loads: 46 gr. Win. H. P. Bullet
Federal 200 Primer
Winchester Super Speed Case

.22 HORNET—STD.		.22 K-HORNET	
8.5/2400	2090 F.p.s.	10.0/240	2410 F.p.s.
9.0	2250	10.5	2620
9.5	2420	11.0	2670
10.0	2460	11.5	2760
10.3	2565	12.0	2870
10.5	2630	12.2	2870 Max.
10.7	2670	12.5	2800 Rem. Case
Rem. Factory	2750 (Lot BOE-45)		
9.5/4227	2255	11.0/4227	2550
10.0	2295	11.5	2665
10.5	2450	12.0	2700
11.0	2550	12.5	2800
11.5	2590	12.8	2810
8.5/H240	2450	9.0/H240	2475
9.0	2565	9.5	2640
9.5	2730	10.0	2710
10.0	2800	10.5	2815
		10.8	2880 Max. N.B.

N. B.: Even 0.1 grain more H240 will give excessive pressure, and 0.2 grains more will enlarge primer pockets.

All data shown is taken from chronograph tests fired to compare these two cartridges. These are not load recommendations. Each shooter must work up loads to suit his gun. A crystal controlled counter chronograph was used to measure all velocities. Values shown are averages of at least five shots.

2400 Velocity difference—200 F.p.s.—7.5%
4227 Velocity difference—220 F.p.s.—8.5%
H240 Velocity difference—80 F.p.s.—2.9%

powder were fired on the same day, and all loads were assembled from the same batch of components. The only real variable was the cartridge case; one a standard .22 Hornet, the other the Kilbourn variation, with nine percent greater case capacity. The differences between rifles was minor, and any advantage in their dimensions would be likely to favor the K-Hornet.

The chronograph test figures for these loads show that the K-Hornet is no wonder cartridge. What Lysle D. Kilbourn did was add 9% to the volume of the Hornet cartridge case, and 8% to its velocity capability. It does NOT, in some mysteriously efficient way, get more velocity out of a grain of powder. On the contrary, it requires more powder to get equal velocity. Note the loads of 2400 in the test tabulations. Furthermore, some velocity figures reported for it have been **enthusiastically exaggerated.** Even with pressures high enough to bulge primer pockets, and to extrude primer cups, the K-Hornet doesn't drive a 46 grain jacketed bullet 3000 F.p.s., at least it never does so when looking an accurate counter chronograph in the eye. The heaviest loads shown in the tabulations fired, except for an experimental test with of our tests are as heavy as should ever be precautions, and they show 2870 Fp.s. as the top velocity with 2400 powder in the K version.

With 2400, top loads represent top pressure, don't exceed them, or even load them without the usual build up from loads 2.0 grains lighter. Hornet pressure can go hell for high despite the small look of it. With 4227, the top loads are a case full of powder. Any small increment in charge weight that can be picked up by tamping it in and compressing the load with the bullet, won't change the velocity picture appreciably, but you will pay for it in poorer accuracy. This DuPont powder is a good one in both versions of the Hornet, as the loads tested show.

When we come to H240, a Hodgdon salvaged cousin of 2400, this newcomer is a bit too fast for the K-Hornet. It will give velocity as high as will 2400 in it, but any attempt to raise speed further will get you into trouble in a hurry. It is even faster than its commercial cannister relative, and it will extrude cartridge brass all over the place, if given any provocation. If you use it in the K case, be CAUTIOUS; better yet, stick to 4227.

In the standard Hornet, H240 delivers some really new performance, before high pressure calls a halt. With it, the regular Hornet pulls up to within 3% of the bulged brother. Caution is needed here, too, as the case will accept an overcharge of this powder.

Note the velocity of the Remington High Speed factory load. It's pressures are high. The powder used is unknown.

So, in the moment of truth on the test range, to the cold eye of the counter chronograph, these two look like any other cartridge cases that differ by 9% in volume: the bigger one gives a little less velocity increase than its capacity advantage over the smaller contestant. Velocities, sometimes reported for the Kilbourn creation, have been 200 F.p.s. too high. It does not exhibit any detectable improvement in efficiency, as often stated or implied, sometimes with claims of better combustion of the charge, as compared to the regular factory brass.

And this is all that could have been expected. There isn't any magic about gunpowder. It's pretty predictable, if you keep your head in place, and don't let wishful thinking get the best of you.

We are glad that we finally investigated this one, and pleased that it turned out as logically as it did. There are no mysteries and unexplained paradoxes left lying around to plague us, except, perhaps, why so many of us like to fool ourselves with such improbable dreams, as that there really are case shapes and other combinations of factors that offer strange extras in efficiency,—in a word, something for nothing.

While both the regular and the K-Hornet are on the wane in popularity, they still make nice little guns for their intended purpose, and will effectively exterminate varmints within a range of 150 to 175 yards. They will do it quietly, and with less expensive loads than the big brash boomers that some newer nimrods now favor. Reloaded, they are both less costly to shoot than the .22 WRF Magnum and much more versatile and effective. Perhaps those results with H240 (a good powder in any small case) will increase the interest in that old favorite, the .22 Hornet.

By: Edward M. Yard
Chris H. Helbig

An EXPERIMENTAL BALLISTICS ASSOCIATES TEST REPORT

National Bench Rest Shooters Association, Inc.

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NBRSA MEMBERSHIP DUES:

Individual annual dues $5.00 (includes magazine subscription for membership term). Associate member (wife or husband, son or daughter under 18 years of age, of member in good standing—no magazine) $2.50. Life membership, $75.00. Annual club affiliation fee $10.00.

PRESIDENT'S CORNER

As you read this another year will be bowing out and become history. Did your organization live up to what you expected of it? Only you can answer that question. If the answer is negative, then it is up to **you** to take an active part in the working force.

The organization is gradually increasing in membership. Credit for this increase belongs to you members, collectively and individually. You are the only real and practical way this organization has to make contact with prospective members. You have much to offer a prospective member, in that we sponsor a variety of classes. If he is interested in accuracy and target shooting, one or more of these classes should fit his ideas. Our members are proud of the fact that anyone who wishes to improve his shooting can obtain information by **asking for it.**

In the past year we have added a number of clubs to our membership, some of which became active almost immediately and some are building and planning for 1962.

We held a record number of shoots during the past year, both in unrestricted rifle and for varmint and sporter rifles. Top attendance at any one match did not equal some of the records of the past but this is to be expected due to the increased number of matches.

The Heavy Varmint class registrations are the shining star for 1961 and I predict that 1962 will see a terrific increase of shooters in this class.

In thinking of our sport as it was about ten years ago I was suddenly struck by the similarity of equipment used at that time and that which is used by the Heavy Varmint class shooter of today.

New records were made in all classes and came so fast that many times they were held only a short time and new records replaced them. More world records were made this past year than ever before in a single year.

I have been re-elected as your President for 1962 and as in the past year I will give all of time that I can possibly spare to improve our sport in interest, competition, good sportsmanship and the improvement of rifle and equipment, and in return I ask you to lend a helping hand to your Directors, Deputy Directors, Officers and the bench rest clubs to make 1962 a most successful year.

I have received many letters from the members and have answered a good number of them. To the writers whom I did not answer, my apologies, but I just did not have the time to do it. My sincere thanks for all letters I have received for they were sincere and helpful.

With your help. 1962 can be a most successful year. Let us all join together and make it just **THAT.**

Until Jan. '62,

Bob Hart

NOTICE
EASTERN REGION MEMBERS

The winter meeting of the Eastern Region will be held at the Mark Twain Hotel on Saturday and Sunday, January 13th and 14th, 1962. Members and club representatives are urged to attend.

One of the functions of this meeting is to set the schedule of matches for the coming year. In addition to our regular matches this Region will hold the National Championship Varmint and Sporter Matches for 1962 and the Eastern Region Championships for both unrestricted rifles and for varmint and sporter rifles.

Clubs should give their representatives who attend this meeting a schedule of match dates desired and alternate dates for adjusting the over-all schedule.

Other business of the meeting will be the election of a nominating committee for the selection of candidates for Director and Deputy Director for election at the Johnstown Match in September; discussion of conditions, improvements and recommendations to your Director and Deputy Directors for the annual Directors Meeting; to hear the Treasurer's report; and other items which may be brought up by members at the meeting.

Please give the Eastern Region Officers your support by attending this meeting.

Robert W. Hart
Eastern Region Director

NEW BENCH REST RECORDS

The following new bench rest records have been recognized and record certificates awarded to:

M. H. "Mike" Walker, Mohawk, New York, for an aggregate .5238 inch for five 5-shot groups with Sporter rifle. The record aggregate was fired at the National Championship Varmint and Sporter matches at Reed's Run Rifle range in Augusta, Ohio, on July 21, 1962. Walker's rifle was a Remington 40-X chambered for the 6m/m-222Mag. cartridge. His load was 25.5 grains 3031 powder and 75 grain bullets.

Arthur J. Freund, St. Louis, Missouri, for two aggregate records with Sporter rifle; an aggregate of .5988 MOA for five 5-shot groups at 200 yards and a National Match Course aggregate of .5775 MOA for five 5-shot groups at each 100 and 200 yards. He shot these aggregates with a 6m/m International in Douglas barrel on Shilen action, gunsmithing by Shilen and stocked by himself. The complete rifle with scope (Lyman 8X) weighed 10 lbs. 6 oz. His load was 32 grains 3031 powder, his own 73 grain bullets made in B&A dies and CCI primers.

H. B. Reagan, Big Spring, Texas, for a 5-shot group at 100 yards with Sporter rifle measuring .2038 inch. Reagan shot the record group at the Texas Varmint and Sporter Rifle Championships at San Angelo, Texas. His rifle was a 6m/m International in a Remington 722 rifle with 26 inch barrel which he stocked himself, the rifle with 8X Weaver scope weighing 10½ lbs. His load was 30 grains 3031 powder, Sierra 75 grain bullets and CCI primers.

While he did not make new records, Edgar Walker III, Louisville, Ky., gets honorable mention for firing in his first registered bench rest competition aggregates which were submitted for judging. His aggregates (unrestricted rifle) were: 100 yards .2948, 200 yards .3314 and NMC aggregate of .3131 MOA.

.30 CALIBER BENCH REST AWARD

Brunon Boroszewski, who established the $100.00 cash award for the shooter firing the smallest bench rest National Match Course aggregate, in a registered match during the 1961 shooting season, is requesting everyone who may have completed such a course with a .30 caliber rifle to report to him before January 2, 1962.

He plans to announce the winner of the award at the Eastern Region, NBRSA, Winter Meeting in Elmira, New York, January 13-14, 1962.

In order to be considered, the details of the aggregate, where shot, and the details of equipment used, must be submitted and received by Boroszewski not later than January 2, 1962. His address is:

Brunon V. Boroszewski
Chestnut Ridge Road
Orchard Park, New York

BENCH SHOOT AT TULSA, OKLAHOMA

The Varmint and Sporter Rifle shoot conducted by the Hot Springs Gun Club (Ark.) on the Tulsa Bench Rest Club's John Zink Range, October 29th, had a disappointing entry of 13, largely due to conflict with the open deer hunting season in the region.

Shooting conditions are reported to have been rough and the perplexing winds of that range caused several to disqualify in one or more 200 yard matches.

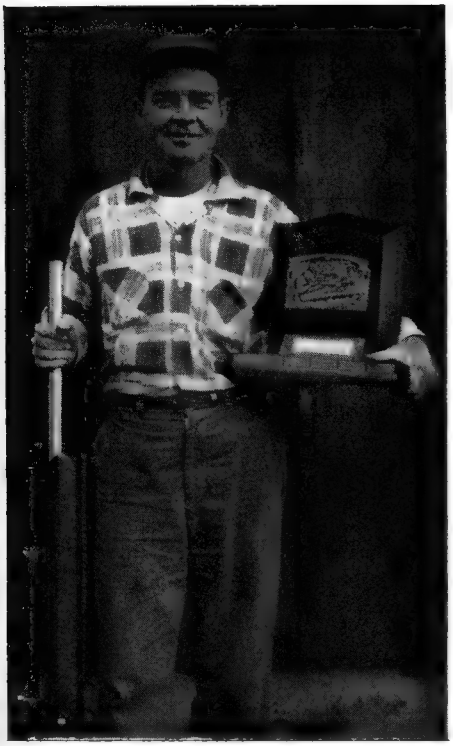
The top aggregates were:

VARMINT RIFLE

	100 Yds.	200 Yds.	Grand
Red Cornelison	.655	.8115	.733
H. E. Powers	.657	.8110	.734
C. R. Davis	.811	.9030	.857
R. G. Berry	.571		
Ernest Mayfield	.638		

SPORTER RIFLE

Don Crouse	.782	1.352	1.067
Audrey McDonald	.967	1.235	1.101
Tom Gillman	.832	1.768	1.303



Bob Stinehour holding the Southboro Rod and Gun Club "Season Aggregate Trophy" for its bench rest matches. Bob is first winner of this fine trophy.

THE SOUTHBORO AGGREGATE TROPHY RACE

This past season the Southboro (MASS.) Rod and Gun Club gave up cash prize awards for the three registered bench rest matches they conduct each year. In place of that system they adopted a single tournament fee, about a dollar more than their previous "registration" fee, which covered the entire fee for shooting in the matches. They did not award any prizes for the separate matches but did award gold, silver and bronze medals to the three smallest aggregates at each match and provided a beautiful rotating Season Aggregate Trophy (which Bob Stinehour is holding in the photo) to be awarded annually to the shooter with the smallest aggregate for all three matches.

This departure from the usual program system in the area was considered an experiment, with probably some of the club members a bit worried about its effect on match attendance. Rather than any drop-off in attendance, the overall attendance increased somewhat, several shooters in the area made their first entry into registered benchrest competition and the season aggregate feature developed much interest and some photo-finish competition among three or four of the better shooters.

Going into the final match, in October, Dr. Garcelon from Augusta, Maine, was leading Stinehour by a .0125 MOA (and that's quite a lot in bench rest aggregates). Garcelon beat Stinehour in four of the five 5-shot matches at 100 yards to widen his lead. But Stinehour didn't give up:—there were still five 10-shot matches at 100 yards to go. Stinehour beat Garcelon in all five of the 10-shot matches to end up with a slim .0012 MOA margin over Garcelon to win the Trophy.

It seems reasonable to expect increased interest in that Southboro Aggregate Trophy next season, that it will take more than a minor complaint to keep some shooters from attending all those matches, and that there will be a red-hot race to win that trophy in 1962.

P. H. T.

REGARDING DOUBTFUL DISQUALIFYING SHOTS

Dear Phil:

Here is something I think you should print in regard to the Reticle Rule.

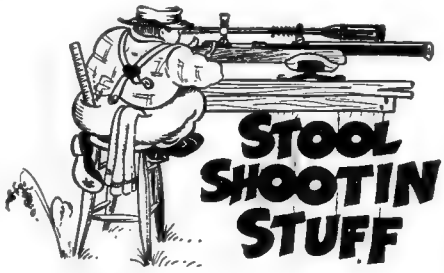
At the Fresno shoot, there was a single bullet hole which was a questionable shot; did it touch the black border line or did it disqualify. Here is the way to tell.

All the reticle circles I have made are .216 outside diameter while the bullet is .224 diameter. This difference because a bullet makes a hole that is smaller than its diameter by an average of .008 inch. Therefore there is .004 inch on a side.

Put the reticle circle as concentric as possible with the bullet hole in question. The circle can miss touching the black border line of the bench rest target by .004 inch and the bullet will have touched the black line and **is not** a disqualification. While the circle is in proper place over the bullet hole, move the circle over till it does touch the line; read how much it moved on the scale or dial and if the reading is less than or exactly .004 inch, then that shot is in and not disqualified.

This had never occurred to me before because there had never been one shot like that in doubt. It just may be that others have run into this too and they figured how to do it; this is for the benefit of those who do not know what to do and they might rule out a shot that was really in.

John B. Sweany



Dear Phil:

Who said winter would never come? It is here with a bang this morning and if Vermont is as much colder as it usually is than Cape Cod, you've probably got more reason to comment than I. I use the word "comment" instead of complain intentionally because after all, although I notice weather when it is good or bad, I just have to live with it. Like most of the rest down here, I chose Cape Cod because of its bright sunny days and beautiful landscapes and seascapes so characteristic of it. The reddish brown leaves of the oak trees are hanging on and among them the bright green of the pines are beginning to stand out as they do through the winter months. The frost has not been bad enough to kill the lawns and where there is a little shelter to reflect heat from the house, our rose bushes, at least as of this morning, were bearing many buds and blooms. We did not get the snow that Boston and the rest of New England got and for this we make no complaint.

However, here I am with Merrie, bound first for a serious day of business in Boston, and then down to Maine (with my station wagon packed to the glass line with bedding rolls and hunting gear) where Merrie hopes to get a deer to match mine that I got and already have in the freezer.

Did you notice that I said "down" to Maine? I am sure that many readers in other parts of the country will make a mental picture of the fact that Maine is considerably north of Cape Cod and that I should say "up" to Maine. Well, sometimes I do, having spent thousands of hours flying and naturally consider the northbound course "up," but don't think I am not frequently questioned for saying "up" as New England coastwise inhabitants just are not accustomed to saying "up to Maine." They speak of going down to Maine as a natural expression because they heard their fathers, grandfathers and great-grandfathers express themselves that way. The reason is that they thought of it in relationship to the prevailing winds which were generally downwind to their sailing boats, as they headed for these areas in the past frequently used method of transportation. Conversely the people along the Maine coast had to head into the wind, and take both a longer period and a longer course as they tacked back and forth to go "up" wind to Boston. (Editor's note:—We in northern Vermont "go over to Maine," since we have to cross the White Mountain range in New Hampshire. We New Englanders are a literal breed.)

Now that we are talking of old days, I might as well cut in a paragraph or two and express my often thought wish that there were wild turkeys still around that I might go out and shoot for the Thanksgiving dinner table. There were undoubtedly many at the time of the Pilgrims but I question whether there is a living wild one within a hundred miles of Plymouth. Probably many succumbed to the fowling pieces of those days and there must have been both thrill and skill as important elements of the hunt, but the turkeys died off and disappeared soon after the huge native oak trees were cut to odd shape and size pieces for many of the staunchest sailing vessels. The oaks are now growing back but I think my life will be over before they are of great importance. The careless use and control of fire among those who frequent the woods in the first half of the 20th century must bear most of the blame. Perhaps I shouldn't say those who frequent the woods quite so glibly because it has long been my experience that the true woodsman is the most careful of all persons about fire.

While we don't have turkey, there are lots and lots of geese and brant along our seashores, inlets and bays but they are getting harder and harder to shoot. There have been too many houses with their late burning lights built around the inland lakes and ponds for the geese to drop in and fill their "innards" with fresh water delicacies. The truth is that the shorelines of these ponds and lakes have been so greatly changed by vacationers and residents that the feed is no longer available in sufficient quantity to entice seabirds.

I am told that they don't decoy as well as they used to generations ago and the luxurious hunting blinds of yesteryear are fast disappearing from the picture. There is one way in which they are taken in considerable numbers, but that way, too, is fast disappearing from the picture. It is the sneak-boat and sculling method, well known to Cape Codders a generation ago, but now such a boat and a capable handler are rare indeed.

I must give credit where credit is due and say one of the most capable boat scullers that I ever met did not come from Cape Cod at all, but he did in his younger days, hunt on Cape Cod and Chesapeake Bay where he demonstrated his prowess. Those who have hunted with us on some of the Maine deer hunts will recognize Harold Houdlet, than whom I have never met a more capable and enthusiastic hunter. He enjoys hunting as I do, using all kinds of guns, but it is pretty safe to say that his first love is duck hunting. I shall never forget the thrill I got as he rapidly, but as quiet as the drifting tide, sculled me in among unsuspecting ducks.

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Stool Shootin Stuff

(Continued from Page Eleven)

The sneak-boat itself is a fine piece of perfect equipment from the efficiency standpoint but it was built for efficiency without giving much thought to comfort. The boat must be perfectly dry else the shooter and sculler will lie in one or two inches of water but, even if it is dry, one finds himself crammed in an awkward position as he tries to hide and make the boat look like a drifting log on the water surface. During this time Harold is softly sculling and whispering that we are getting near to the flock or that two birds are just leaving or ten coming in. He already had identified them before he even started for them, so far off that I could hardly see let alone identify them. Experience teaches the shooter that at last Harold will say "Already, give it to them" and the excitement will be at fever pitch as one attempts to bag his chosen birds after they rise from the water. To shooters who never cease to regret the passing of the big bag limit, such a system of hunting seems hardly worth while when only two ducks a day are authorized but I assure you that the thrill is there and every moment is worthwhile.

Well, Phil, how did you like the deer that Bob Stinehour took over with him when he joined you for a hunt in Vermont? I thought it was a pretty nice specimen and I had the kissin' cousin of it aboard my car as I left for a few days more hunting in the coastal area. I am sure Bob must have told you how he, Bill Cotter and I stayed up late into the night arguing against considerable opposition about the advantages of telescopes for modern hunting, even as it applies to the eastern deer.

We contended that it is more advantageous under most conditions, and practically all it takes is a little getting used to it. Certainly it gives you a chance to identify size and sex more readily, and a clearer, surer image of your target. I don't expect to see the day when everyone is converted. Thirty years ago, it took me ten previous years to get converted to my first hunting scope which I earlier had abandoned. I am happy to say that my eyes are pretty good but they were better than is the case with most young people.

Many hunters who object to the scope today say there isn't time to look through it and focus it on the deer. Of course there isn't sometimes, and it is readily agreed that in many shots the gun must be pointed rather than aimed, but I say the fewer of those that are used the better percentage of clean kills will be obtained. If your gun fits you, whether it has iron sights or a telescope, you are ready to pull the trigger the instant it reaches your shoulder.

You don't lift the gun to your shoulder and wiggle it back and forth as you look through the glass lens any more than you wiggle it back and forth to snug the front sight on the notch of the rear sight or an aperature. You just pick up the gun and point it, no matter how close or how far, and if you are shooting with both eyes open, there is plenty of field of view. Anyway, Bob and I proved our point because we both got good deer on long running shots and the deer frequently were blanked out by pretty thick growth of hardwood.

I told you in my last letter that I was becoming a little leery of the performance of open point bullets with a small aperature, and that lead was again becoming my preference. I had quite a tip on those I used this year, but only the one shot, and that wasn't enough to conclusively prove that I need such a protrusion of lead at the point. The bullet seemed to perform very well and I do not know how much of its 145 grains was lost as it passed right through the deer after completely pulverizing the upper leg bone. It tore off the entire top of the heart and the exit hole in front of the right shoulder was nearly 2" in diameter. My current impression is that the bullet is very good for white tail deer but might be breaking up too soon to obtain the maximum effectiveness on tougher and heavier game. Had I been shooting through thick brush, I well might have lost much of the lead point.

We come right back to the same statement that has frequently been made and that is that no gun, no cartridge, bullet or load can be ideal for every condition that one meets in the woods. We have to outguess the wind and mirage at the matches and outguess the game behavior as well as the prevailing conditions when we are hunting.

The recent article on barrel wear makes we who shoot a lot think things over pretty carefully. It has often been said that the one gun man is the one to be aware of and a person who generally does best at the matches, but as Mr. Culling pointed out, we are really very lucky when we get one barrel out of six that performs so perfectly that we have no reason to complain of the capability of the barrel. When we have that one specially good barrel, perhaps it would be wise to do some of our practicing and shooting at minor matches with another gun that is almost as good.

I have looked through some bore scopes at my barrels from time to time but I never could get as clear a view of them as the photographs that Mr. Culling used in his article. They certainly were revealing. My own experience has been in looking at the barrels that I am left with a mild case of jitters, and I marvel at the guns shooting as well as they do. I have found out from long experience that the use of a cotton swab for a cleaning patch will quite clearly indicate some of the conditions of the interior of the barrel. It normally won't indicate tight or loose places well enough to equal slugging but I do think that rough areas are quite accurately indicated. The cotton swab should not be too moist from Hoppe's or oil if a good sense of feel is to be obtained and of course the test should be made after a barrel is cleaned and wiped dry.

Let's get together and give President Bob Hart some real support on this problem that he has about gun classifications. The date of the Winter Meeting has been altered in an effort to increase the odds for better weather during that weekend. It is a gamble, of course, but I believe a reasonable one and I sincerely feel that shooters should attend that meeting and be heard. We owe it to our sport to make the effort and absorb the expense of going to that meeting if we possibly can, and try to work out a system where peaceful coexistence can be accomplished. I haven't the least hopes for success for peaceful coexistence with Russia, but we have brains enough within our organization to improve our sport without the bickering, the intolerance and the downright pettiness characteristic of some of our past gatherings. Bob seems to me to be a man who will accept sincere efforts to aid in reaching a solution.

Many of you who read this live so far away that to attend the meeting is impractical but some do have typewriters or access to them, but if not, outline and review your thoughts a few times and scribble them on a piece of paper and get them to Bob as well as to your local director.

We didn't like some of the things that were said about us last year and we chafed because they were written for the eyes of readers, many of whom knew little about our problems or our sport. Disliking these things which were said, as we do, we must, however, be rational enough to realize that

some of the statements approached accuracy if not the ultimate in it. Only weak people blindly refuse to accept criticism and I am of the opinion that the benchrest clan have frequently demonstrated that they are far from weak. They are tremendously capable at their chosen sport and the intelligence level is so high that they should be of real help to Bob. I am sure he will not ignore the assistance we can give him. Will you please do your part.

Cordially yours,

Ernest Stinehour

ON BARRELS, ACTIONS AND STOCKS

By Ed Shilen

I have just finished reading Henry Campbell's letter to P. S. concerning his opinions on "Barrel Stress Relieving." I certainly hope that Mr. Campbell doesn't consider this a grudge letter as it is anything but that. It is just that I believe that he is guilty of a fault that many of us (including me) happen to have. That is the fault of making a conclusion and stating it as a fact when it is actually a "Guess," and not based on fully proven facts. Mr. Campbell stated in his letter that he had experience with three Timken steel barrels that didn't begin to perform until they had from 200 to 300 rounds fired through them, and that the reason for them shooting better was that the "Shock" of the shooting "Cured" them. I would certainly like very much to know just how he arrived at this conclusion, and how he knows that it wasn't some other factor than the "Shock Treatment" that made the rifles shoot better.

Now let me give the reason that I believe was the cause of Campbell's rifles performing better after they were shot a while and also the reason why I believe this to be so. His rifles were more accurate after shooting them because the shooting smothered up the barrel bores, took out detrimental tool marks, burrs, etc.,—just as simple as that. No hokus-pokus about barrel "Curing" was involved. Personally I would rather lap a barrel by hand to smooth it up than to shoot two or three hundred rounds through it to accomplish the same thing. The lapping process is both less work and less expensive. I have from experience convinced myself that a really good barrel will start shooting well the first time you set down to a bench with it, PROVIDING that all other parts of the rifle are in perfect condition. That is not a guess; it's a conclusion based on considerable experience. Let me give some examples from this past shooting season. Gerry Arnold of Fassett, Pa. won the first bench rest shoot of the season held at Dryden, N. Y. this past year and the gun only had some 50 rounds through it before the matches started. He was shooting a Hart barrel. Gerry is now waiting for confirmation on two world records that he made with that same gun. On my own Varmint rifle in .222 caliber I have used two different barrels (first one got worn-out). This first barrel was a Holmes and the second was a Hart. Both of these barrels were perking in less than 40 rounds.

The 6m/m Hart barrel on the rifle that won the Light Varmint Class at the Nationals for me was shooting A-1 just as soon as I hit the proper bullet-load combination, which was under 100 rounds. Ask Bob Stinehour about the groups from the first 13 shots from his 219 Varmint rifle with the Hart barrel. The first three shots measured .150", next five went .300", and the following five went .300".

If Mr. Campbell wishes I can give many more instances where this same thing has happened. The point is: These were first class barrels to start with and were a tribute to the barrel-makers skill. And the Stress Relieving was done in a modern heat-treating furnace. No Shock Treatment or Burying them out in the back yard was necessary to make them superbly accurate rifles. If anyone can prove, not guess, that curing a rifle barrel after it has left the barrel-makers hands will improve its performance, I certainly wish he would do so. And here is something that will really make someone sit up and take notice. As far as I now know, a barrel that has **not** been properly Stress Relieved by the manufacturer will usually shoot WORSE instead of better after it has been shot a while.

My experience with rifle barrels has been not only with the beautiful Hart and Holmes barrels (only a gun-nut would consider a barrel beautiful) but also the Douglas barrels which Mr. Campbell referred to. Douglas doesn't claim to make the finest custom made barrels in the land. He says he makes the finest PRODUCTION made, and I believe they are just that. I have gotten very good results with Douglas barrels but I hand-lapped them. And they, like the Holmse and Hart barrels, needed no shooting in.

I am not quite stupid enough to try and say that every gun that leaves my shop is an immediate match winning rifle; it just ain't so. But in every case where a rifle didn't start perking in a reasonable amount of time (less than 200 rounds) the trouble was almost always in other than the barrel. And in the few cases where the barrel was at fault, no amount of shooting ever made them shoot with real accuracy.

Campbell also made reference to the Chrome-Moly barrels giving less trouble than the Timken. Here I believe that he is right and the reason is that the Timken steel is a much tougher alloy than Chrome-Moly and as a result is more difficult to machine to a near perfect finish. This means that as a general rule the Chrome-Moly barrel will have a smoother finish than the Timken.

I also believe that far too many times the blame is put on the barrel when the trouble is really elsewhere. The part of the rifle that is most often to blame in this respect is the stock. The number of barrels that have been junked because they were believed "No Good" when the trouble was in the stock would be staggering.

Now that I've gotten onto the subject of stocks I may as well go on with it a little deeper. I'm not talking about the outside; you can have that part any way you want it providing it fits good enough so that you can hold and sight it from the bench. I'm interested in the really important part; the INSIDE. I'll not stick my foot in my mouth and claim that a bedded barrel is better than a free-floating barrel or vice-versa. Both types have their advantages and disadvantages. Personally I have had best results with the barrel completely floating. Some stockers have gotten very

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On Barrels, Actions and Stocks

(Continued from Page Thirteen)

good results bedding the receiver and one or two inches of the barrel just in front of the receiver and then floating it the rest of the way. Me,—I like lots of air around the barrel its entire length. So all references I now make to bedding will apply only to the action with the barrel hanging in the breeze.

For me the most difficult receivers to bed are the flat bottomed Mauser type. This means Mausers, Springfields, Enfields, Sakos and Model 70's. I am supposed to be a Stock-maker, but will frankly admit that these actions give me fits when it comes to bedding them. There are probably others that I don't know of, but Taylor and Robbins are the only stockmakers who I think can **really** bed these Mauser type actions and get top accuracy out of them. Of the Mauser type actions, the Model 70 gives me the least trouble, and the military Mausers with the thumb cut-out in the side the most trouble. Remington actions with their round bottoms were always the easiest for me to bed and in turn gave the best accuracy. So, naturally, when I developed my own action it had a round bottom. I've already said that I can't bed a Mauser, so I will tell what has given me the best results with the round bottoms. The important thing is to have the receiver bedded perfectly even in the stock with no high or low spots and having the recoil lug bear exactly square on the recoil shoulder of the stock, both up and down and side-ways. Contact of the recoil lug is fairly easy to check by applying a thin coating of lamp-black, prussiam-blue, etc., to the back face of the recoil lug and then putting the barrel and action into the stock. Checking the receiver bedding is more of a problem because when the guard screws are tightened they pull the receiver down into the stock and many times show a good print when it really isn't so.

Here is how I check the bedding of the receiver. Put the barrel and action into the stock and tighten the front guard screw. Now place a finger on the tip of the forend so that it is touching both the bottom of the barrel and the wood of the forend, then tighten the rear guard screw—very little or no movement between the forend and barrel should be felt when that back screw is tightened. If the forend "Springs" away from the barrel when this rear screw is tightened, it means that the stock has a high spot or hump in it which is keeping the receiver from laying flat in its bedding. After you have spotted and scraped anywhere from one hour to one week (I actually know of people who have spent that much time to get a perfect bedding job) and gotten the job to the point that tightening the rear screw doesn't give any movement at the forend tip, tighten both the front and rear guard screws and then put in the middle screw and again check the forend for movement when that middle screw is tightened and loosened. Here again you should feel little or no movement. If you do it means that you have a low spot in the bedding. It's darn near impossible to tell exactly how to go about getting the bedding done. But when you are done, you should be able to loosen and tighten any guard screw and not feel any movement to speak of between the forend and barrel. And don't forget to double check the bearing of the recoil lug when you finish bedding the receiver. The scraping you did to get the receiver bedded right may have changed the bearing of the recoil lug.

A good barrel and action bedded as I have tried to describe has always given me the very best in accuracy. Now don't go screaming "Bloody Murder" to your stockmaker because you just checked the bedding as I have described and it doesn't look right. In the first place wood "moves," and moves much more than most people realize. A stock can actually warp enough over night to throw a perfect bedding job out of "kilter." If you aren't capable of touching up the bedding you should periodically return the rifle to the stockmaker to have the bedding checked and tuned. But don't expect the guy to do this work for nothing—it's not his fault that the wood won't stay "put."

One way of doing this tuning yourself is to use shims of cigarette paper, placing them in the proper place under the receiver to take out any apparent "Spring."

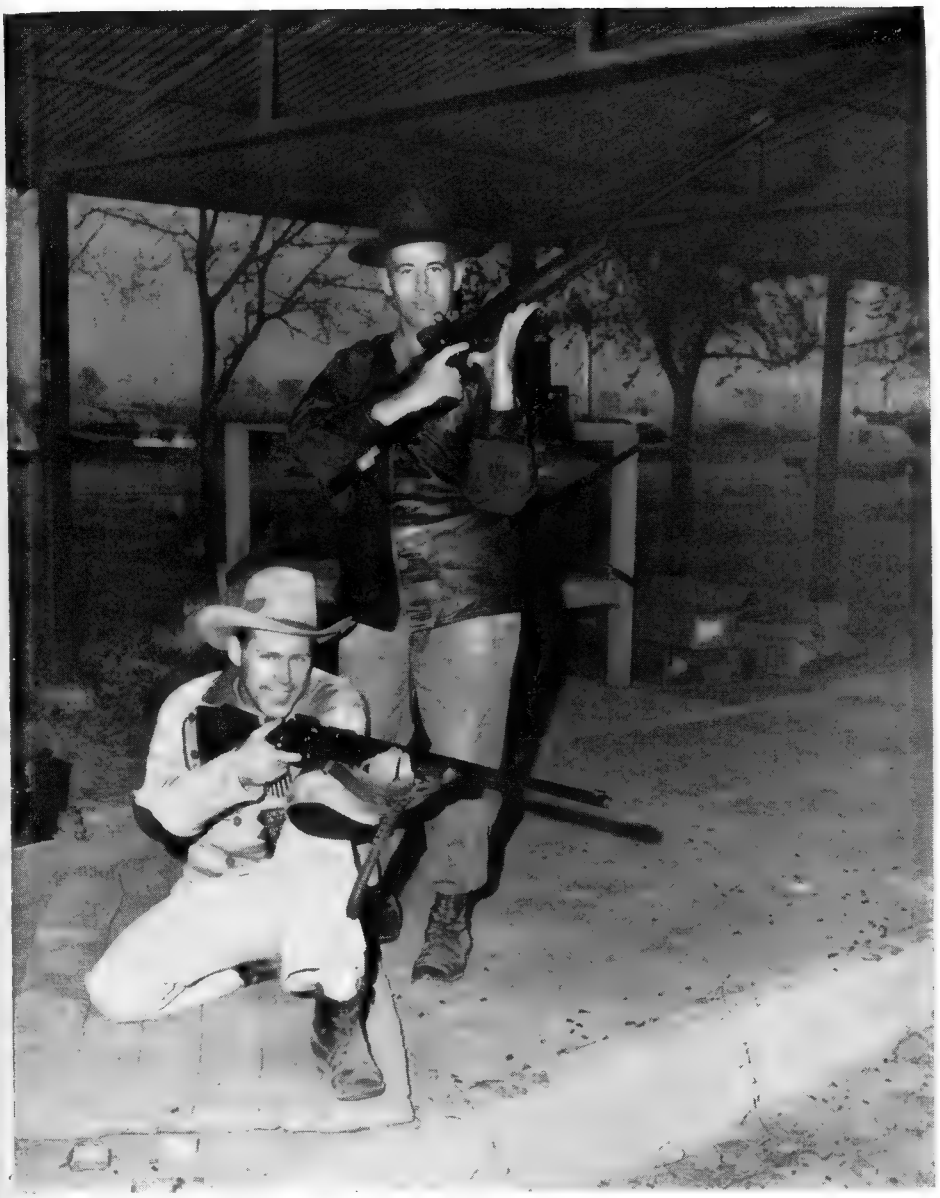
While I'm at it I may as well go into the use of glass and plastics for bedding. At this time I firmly believe that for accuracy alone, nothing will beat a perfect, or perhaps I should say near perfect since there is no such thing as a perfect bedding job in wood. But I also believe that an amateur who doesn't know how to bed a rifle correctly, or is incapable of doing so, will get better results using glass or plastic. In the past I have taken two different guns, both of which were shooting very well bedded in the wood, and glass bedded them. In both cases accuracy was NOT as good after they were glass bedded. In the last year I have been getting reports from shooters who have tried the various types of plastic. The fellows from the Mid-West speak very highly of DEV-CON, commonly called plastic steel. I myself have had a degree of success with a plastic called "Stockmaster." This I used in a stock which was so soft that it would not hold its bedding. The application of the "Stockmaster" improved it but I still think that the rifle would shoot better if it was given a new stock of good hard wood and bedded in the wood.

When I bedded that rifle in the "Stockmaster" I made a little experiment which was quite surprising to me. After the barrel and action was removed from the stock after the plastic had hardened, I coated the action with spotting dope and put it back into the stock to see just how well it was fitting. I took the barrel and action out and found that it was bearing very heavy on the bottom but almost none at all on the sides. I even put in a thin second coat to compensate for possible shrinking but the results were the same. It proved to me that the plastic didn't give the perfect fit that it was supposed ot. I do believe that some day a bedding material will be developed that will really work. Maybe such a thing is already available and we bench shooters haven't discovered it yet. It would be interesting to hear from shooters who have tried something different for bedding and hearing both the good and bad reports of it.

Tournament Circuit

(Continued from Page Three)

in the Dewar. At 100 yds., it was again Hill, 400-34x, and Auer, 400-32x, out in front, followed by George J. Stidworthy, Jr., Prescott, Ariz., 400-28x. Marine reservist Melvin McCarty, Anaheim, Calif., took the 50-meter with a 400-32x, Creedmooring Willbrandt, one X ahead of Grater. Hill took a tumble here as one shot failed to gauge. He duplicated his 38Xs at



National Champion Victor L. Auer (kneeling), runner-up to Pacific States Fall Round-Up champion Gy/Sgt. James E. Hill, USMC. Photo by Lester M. Gentry

50 yds., however, carefully eliminating the doubtful shot and assuring his status of match winner. Benson was second with 400-37x.

Dropping but 14Xs with scope, Hill clinched the Any Sight Aggregate with the ranking 1599. He confessed that his scope had never had that many Xs in it before, but he recently changed from a Lyman 12-power to a 20-power. The tricky mirage required a higher powered scope.

Any Sight Aggregate:

Hill	1599-146x
Stidworthy	1599-136x
Benson	1599-127x
David Boyd, USMC	1599-121x
Wayne Raxter, Los Angeles	1598-111x
Boydston	1598-110x

Laying claim to all three aggregates and five individual matches, Jim Hill's spectacular triumph was marred by a note of disappointment, felt by the entire field of competitors. He came within a thousandth of an inch of setting a new National Record over the Critchfield course, as he was 12Xs over the existing record. The shots he lost in the two 50-meter matches were so close that they had to be plugged, but, being the true sportsman that he is and displaying confidence in the ability of the scorers, Hill did not challenge. No shooter in America could have touched Hill this week-end. He was unbeatable!

Ten High in Grand Aggregate:

Pacific States Fall Round-Up Champion—James Hill	3198-281x
Master Class	
Vic Auer	3195-248x
Bob Boydston	3194-233x
Bill Grater	3191-234x
A. R. Willbrandt	3191-222x
Cliff Pierson	3191-219x
George Stidworthy	3190-241x
Henry Benson	3190-232x
Herb Hollister, Colo.	3190-222x
Creed Page, Colo.	3190-206x
High Junior	
Jerry Hendricks, Oxnard	3178-171x
Expert Class	
Margaret Malm, Santa Monica	3172-170x
John Hale, Baldwin Park	3171-174x
David Simmons, Oxnard	3168-154x
Fred Malmsten, Los Angeles	3166-180x
Mike Walker, Pasadena	3166-167x
SS-MK Class	
Charles Tate, San Diego	3168-178x
Dennis Bowers, San Diego	3168-168x
High Unclassified	
Robert Lutz, NAS, Alameda	3153-152x
Robert Binyon, South Gate	3161-143x

Winners of the any sight 2-man team match on the international 100 yd. target were 1952 National Champion Robert E. Perkins and Joe Specht of Fresno, Calif. with a 400x28. In second place were Auer

(Continued on Page Sixteen)

Tournament Circuit

(Continued from Page Fifteen)

and Boydston with 400x26. McCarty and Mike Allen, USMCR, were third with 400x24. Forty-six teams were entered.

Hill is still shooting his Anschutz free rifle with Anschutz metallic sights and Western Mark III ammunition. Although the 1961 National Champion just "held his own" in the any sight aggregate with 1597-127x, he gave Hill his toughest competition and finished second in the grand using the same Winchester 52-C with custom laminated stock, Swem bedder, J. A. Bell front sight, Redfield Int. rear and Redfield X-tube which carried him to victory at Camp Perry. He again fired Remington ammunition. After Auer collected his merchandise awards, he left the range saying that he was heading for the hills, little dreaming that those same hills would be a raging inferno the following morning. As California's worst blaze came within 100 yds. of his Sherman Oaks home, TV cameras showed his rifles and trophies being carried to safety.

A random look at equipment used in the winner's circle shows Boydston (who recently moved to Calif. from Billings, Mont., shooting a Mark II BSA Martini-International rifle with Swem bedder, Bell front sight, Freeland tube, and Remington ammo; Grater firing a Hart 52-C with Kenyon trigger, stocked by Grater, Bell front sight, Redfield X-tube and International rear sight with Mark III ammo; Willbrandt using a Johnson-37, Wright-Allen trigger, Bell stock, Bell front and Redfield Int. rear sights, and Remington ammo. Pierson, a left-hander, made the action, trigger, and stock for his Pfeifer barrel. The Lyman 20-power proved to be the most popular scope except that Boydston prefers a 25-power and Benson uses a Bausch and Lomb on his Kenyon sleeved-action Douglas barrel with Kenyon trigger. To round out the top award winners, Stidworthy fired his "trusty" Douglas-37 with Redfield Int. metallic sights and Mark III ammo.

The tournament's only record-breaker, the smog, merits an additional comment or two. The elements have a sadistic habit of conjuring up their wildest and most unusual antics when there is a shooting match in the offing. Never have we seen so many grown men weeping. A crying towel would have been appropriate for a dual purpose . . . A joking comment to Vic Auer that the contact lenses shielded his eyes from the lethal potion under discussion, might be worthy of consideration . . . Lest we discourage potential competitors—: smog has never been such a demon before on this range and probably won't be again. The Western Nationals, April 29-30, will provide an entirely new menu weather-wise!

NEW HAMPSHIRE PISTOL TOURNAMENT

Robert Baxter of Norwood, Mass. led home a field of 70 shooters to take the White Mountain Open Pistol Tournament at the Pioneer Sportsman's Club in Dunbarton, N. H., Nov. 5th, firing a grand aggregate of 877, just two points below the national civilian record.

James Gatherum of the host club led the Experts with an 828 and George Grant, Jr. of Westbrook, Maine, led the Sharpshooters with a total of 812. H. Dison topped the Marksmen with 791 and R. King outclassed the Unclassified in firing a 785.

Del Main

CONN. BIG BORE LEAGUE

The Rippowam team finished the 1961 Conn. Big Bore Rifle League season undefeated to win the league championship. Filling out the five high rankings for this 50 team league were Middlefield, Springfield (Mass.), Bell City and Roslyn (N. Y.).

In the final match of the season on Oct. 15th, Rippowam fired a five man team score of 617-45V X 625 possible to beat Bell City and Middlefield by a 15 point margin, and Bob Wallstrom led his Rippowam team with a possible 125-10V score.

The league course of fire is 5 shots in each the prone, sitting and kneeling positions and 10 shots standing, all slow fire at 200 yards on the Army "A" target.

BARREL INSULATION FOR SUN AND WIND

By Jesse M. Grigg

When the ordinary temperature of ferrous metal is changed in a body whose surfaces are free to move, the external dimensions of the body are changed. If such deformation is resisted by yielding constriction, the metal does an amount of work equal to that which would be needed to cause the same deformation by external forces without addition or subtraction of heat. Thus resistance to deformation is always accompanied by internal stress when temperature is changed. For this reason slack is left in telegraph wires that are strung in summer, and between railroad rails laid in cold weather gaps are left to avoid kinking in the hot season. These and other examples which might be cited in proof of internal stress are also proof that dimensions change with temperature change.

If the temperature change is not equal in all parts of the body, the latter suffers a

distortion which ordinarily disappears when the temperature becomes constant throughout. Further, if the temperature throughout is returned to its original value, the original form and dimensions are resumed, an exception of course being the sudden cooling of steel at hardening temperature. If the body undergoing moderate temperature change happens to be a piece that is long and slender, as is a rifle barrel, and temperatures on diametrically opposite sides are unequal, the dimension change is in the form of temporary curvature. This is necessarily so because the lengths on opposite sides are unequal, and their radii of curvature therefor are unequal, as is indicated in Fig. 1. For the rifle barrel it might be shown that the resulting mean radius of curvature is proportional directly to the product of barrel length and temperature difference between sides, and inversely proportional to the diameter. Thus, in unequal heating, a short, thick barrel is bent less than is a long, slender one.

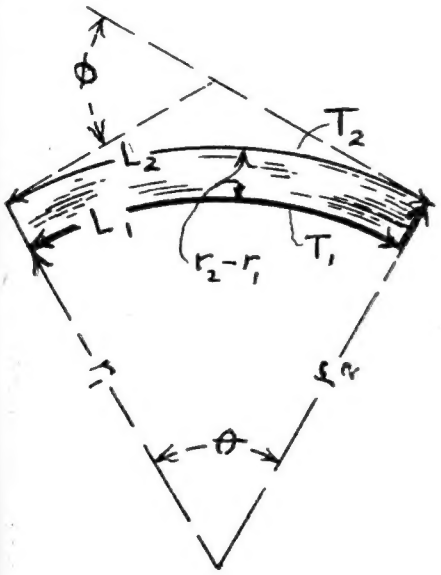


FIG. 1

In a bar or rod the linear change with temperature is less than one might suppose. In fact the change of length due to a uniform 10° change of temperature in a steel bar 30 inches long is only about .00195", which is not much. But if the section is square, measures one inch on a side, and the gradient of the temperature difference uniformly varies from surrounding air temperature on one side to 10° greater or less than this on the opposite side, there will then be in the bar a curvature which subtends an angle of nearly 7 mniutes between radii at the ends. The deviation of the tangents, if the curve were prolonged as in a trajectory, would amount to nearly 7 inches at 100 yards.

The calculation is not simple, for unequal temperatures in a rod of circular section with a hole through it| Nevertheless, judging by the magnitude of bend in a bar of square section, it is obvious that the effect of unequal temperatures on diametrically opposite sides of a rifle barrel is disastrous to the point of bullet impact.

Many years ago I demonstrated by experiment the fact of such curving. A light 24" .22 caliber barrel was clamped in a vise with the sights aligned on a mark. The front sight moved off an estimated minute of angle when the flame of a blow torch was passed along one side a couple of times. After an interval of cooling, similarly short, the front sight returned to the mark. Recently I saw a shooter friend of mine demonstrate the same principle by laying a match barrel in V-blocks and holding a burning cigarette lighter under the middle. An adjacent section of the barrel was deflected an amount which was measurable with a dial gauge.

In all this is apparent that curving takes place only if temperatures on opposite sides of the barrel become uneven. This is a condition which is likely to occur when the barrel is exposed to direct sunshine for an appreciable time. In this event there are two sources of heating. One is internal combustion which imparts heat uniformly around the bore at any given barrel section; the other is sun heat imparted on the side where the sun shines.

But heat gain and heat loss are processes which take place simultaneously. At the same time that heat is being absorbed some of it is being dissipated in radiation. In a continued process, temperature increases until the rate of radiation just equals the rate of absorption. In the barrel, however, constancy in the relation between absorption and radiation is not likely to be attained. The radiation rate, like that of heat absorption in sunlight, is not uniform over the whole barrel surface. Less of cooling occurs inside the stock groove than occurs outside where the surfaces are exposed. Worse, wind blowing on the exposed surfaces rapidly extracts heat, but does so on the side which faces the wind. Moreover, as is well known, winds vary in both strength and direction. Thus as the sun imparts heat on its side, while wind extracts heat on the side to which it blows, and further, radiation in the stock groove is less than radiation outside, it is inevitable that irregular deformation will occur. Even in the absence of sunshine this is possible if wind is present and firing itself heats the barrel above the prevailing temperature of the surrounding air.

In my experience a barrel that is hot to the touch between the receiver and the end of the forestock is one which is susceptible to heat trouble. The breakdown may come very suddenly, and be manifested by a total failure of the rifle to group, a condition which endures until the rifle has been allowed to cool in shade. As little as five minutes in shade may sometimes restore it to temporary accuracy.

An obvious remedy is to avoid firing in direct sunlight, but this is not generally practicable. Not all firing lines are artificially shaded, and umbrellas are not universally permitted. The next simplest procedure is covering the barrel with a light-reflecting substance, such as aluminum paint, an idea that was introduced in my area by Harry R. Tevis and Edw. J. Roth after laboratory tests. The same purpose is served incidentally and even better in use of the bright, stainless steel barrels which are now a familiar sight on smallbore firing lines. To utilize the principle, one shooter I know went so far as to polish all the blue off the barrel of an almost new rifle, and is still glad that he did.

Though the light-reflecting barrel is a vast improvement, and does not become hot to the touch, nevertheless it does become warm after long exposure. Being warmer than the surrounding air, it is thus susceptible to wind cooling, for which reason it may become erratic at times.

Having finally concluded that this was so, I set myself the task of trying to devise a remedy for the wind condition, too. Result was the notion that a combination of light-reflection plus heat-insulation would solve both problems. As to method, enclosing the barrel in a stock of the military type

(Continued on Page Eighteen)

Wind Insulation For Sun and Wind

(Continued from Page Seventeen)

was considered, then quickly rejected in belief that the bulk in a .22 match rifle would be pushed around too much by wind. In the end I adopted an asbestos covering sheathed in aluminum foil, a combination that reflects sun's rays and at the same time insulates against sudden temperature change.

The asbestos covering proved out so well that I am going to describe in detail my method of applying it. The needed materials are gasket shellac, Duco cement, sheet asbestos, aluminum foil, Rust-Oleum aluminum paint, and wrapping twine or coarse thread to hold the coverings in place while the adhesives set. To get the little of asbestos and foil that was needed, I had to buy in the neighborhood hardware store full rolls, total cost $2.45.

The thicknesses of the asbestos and aluminum foil were respectively .022" and .001". Allowing for lapping of the foil and for adhesives and paint it was estimated that the total thickness of the covering would come to a little under 1/32". Accordingly, to provide a suitable clearance in the stock groove, I enlarged the latter 1/32" from the forestock tip to the receiver junction.

Next was cut a piece of asbestos whose length equaled that of the barrel, and whose tapered width was such that the edges would just meet on the bottom of the barrel after all sight blocks had been removed. A thin coat of gasket shellac was applied to the barrel. Then the sheet was wrapped in place, and snugly held there with a winding of coarse thread in turns about half an inch apart, and in some places closer if this was necessary for a fit. After the shellac had dried the winding of thread was removed, leaving the asbestos tightly surrounding the barrel, with very little penetration of shellac.

Owing to its exceeding thinness, the aluminum foil could be applied only by wrapping as one would wrap with tape. Accordingly I opened out several feet of the roll and cut a number of strips about ½" wide and four feet long. Because the stuff was so fragile this seemed to be about the greatest length that could be handled conveniently.

To apply it in such short lengths required frequent splicing. This was done as the wrapping progressed, with Duco cement between the lapped ends, and a few turns of coarse thread or twine at the splices to hold during the short interval needed for the cement to dry.

The next step was to cut out with a sharp knife for the sight blocks after the screw holes had been located with a scriber used as a prick punch. The resulting loose ends and edges were cemented in place with Duco, and held there with a few turns of twine until the cement had set.

Alone, the covering of aluminum foil was very fragile, in fact so much so that to grasp and lift the barrel with the hand would have displaced or torn it. To overcome this fault and still have a reflecting surface, Rust-Oleum paint was applied over the foil. The foil underneath prevented the paint from penetrating and destroying the insulating property of the asbestos. The paint on top worked in between the foil edges, leaving the layers cemented together, and providing a surface almost as hard and durable as if the paint had been applied directly to the barrel itself. To be sure I applied two coats, thus obtaining a covering which apparently can withstand any treatment excepting abuse.

For the first test I took the rifle, a Win. 52, into a tournament without knowing whether it would group or not, this when both the day and the occasion were ideal for resolving this important question. With a dazzling bright sun, and temperatures that reached 93° by mid-afternoon, the day was much too warm for personal comfort. Besides, occasional cross wind provided the cooling effect that was needed for the test. The course itself comprised two any sight meter matches, and of metallic sight matches one was a meter, the other a Dewar course. Moreover, in the air was a heat shimmer which made it impossible for me to call shots in the 10-rings at the longer ranges. Thus I had to sight in and try to stay in on the basis of nines. Notwithstanding all, my score for the day was 1592-104x.

With a score like that on a day like that I felt as if I had cheated on my friends by coming on the line with an insulated barrel. Even so, I could not escape belief that this experiment was equal to the best of anything that I had ever done to a rifle. Nor was that opinion changed by anything that happened during the little of the hot season which yet remained. At present writing I believe that such a covering will be standard equipment on my outdoor rifles from now on.

However, I'd like to have, instead of foil over asbestos, a tightly-fitting, tapered metal sleeve. Maybe next year I'll try to make one of thin sheet metal with its butted edges underneath either brazed together or else secured with solder. If the attempt is successful I'll have the sheath chrome plated.

.222 CASE WEIGHT VARIATION

By Harry Jackman

I have just had an experience which indicates to me that in publishing loads used by shooters of the .222 Remington, it is vital to indicate also the brand of cases used.

I have a Model 70 sported, converted from Hornet to .222, which I bought used with a supply of Super Speed cases. When I first looked through the barrel, I was a little sick, as there was only a trace of rifling left in the first few inches ahead of the chamber. I decided to try it out though, so made up some loads of 23 grs. of Ball C, Sierra 53 gr. HP bullet, which I had seen published in many places. The load shot magnificently, and with the big scope on it I can count on less than half inch 5-shot groups at 100 yards in good conditions.

Another member of our club recently decided to give up the .222, and I bought from him an assortment of cases, bullets and primers. His cases were Peters and Remington, but I didn't think too much about that difference, and proceeded to load up the lot with my 23 grs. Ball C load.

I fired about 30 rounds of these loads a few weeks ago. I noticed at the time that I was getting gas leakage, but it didn't seem serious so I kept on shooting through the match, an informal 200 yard standing match. When I got home and wiped off the gun, however, I noticed a primer-size ring on the bolt face. At first I thought it was just smoke, but it wouldn't come off, so I got out the magnifying glass and had a look. The gas has cut a series of holes in the bolt face. I then examined the fired cases under the glass, and found that about 40% of them had very small pinholes in the primer, at the point where the primer just clears the case.

I had never had any indication of gas leaking with the Super Speed cases, so I then proceeded to weigh five cases of each brand. This was what gave me the answer. Weights were as follows:

	Max.	Min.	Ave.
Super Speed	82.0	80.8	81.4
Peters	91.5	89.4	90.5
Remington	90.7	88.8	89.7

I realize that my barrel is tight, as it

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was a Winchester Hornet, but there are probably many others like me and I hope they don't spoil their guns or worse by using Peters or Remington cases without proper reduction of the load.

A LATER REPORT

Further to my last letter about pressures and varying weights of .222 brass, I weighed 5 unprimed fired cases of each of 4 brands, loaded all 20 with 21 grs. Ball C and Sierra 55 gr. soft point bullets, CCI primers, and ran them through our counter chronograph Sunday, in my converted Model 70 Hornet.

	Case weights		
Brand	**Max.**	**Min.**	**Ave.**
Sup Spd	82.0	80.7	81.4
Peters	91.5	89.5	90.6
Remington	90.7	88.8	89.7
Norma	98.0	96.9	97.5

Temperature was about 70, several warming shots fired prior to recording. Our tapes are spaced 10' apart, the first one about 5' from the muzzle. My barrel is a very worn Winchester factory Hornet barrel, rechambered. In spite of being so worn, and considering that it is a light sporter, it shoots almost unbelievably well.

As expected, the velocities were higher in the heavier cases, but not as much higher as I had expected. Note that the Norma cases averaged **20%** heavier than the Super Speed. I have for years been in the practice of weighing my brass for long range .30 match shooting (and believe it pays off) but have never found such a wide variation in .30-06 brass. I had never weighed the .222 brass, because it was such a little case that I assumed there wouldn't be enough variation to matter.

Our chronograph reads only to hundredths of milliseconds. This means, of course, that a reading in the 2800 fps range as above is probably about 4 to 5 fps greater than actual, on the average, and individual readings are accurate to only 3 digits (assuming, of course, that the machine is accurate to begin with). I suspect that if I had run about 20 of each instead of 5, I would have got a better correlation between case weight and velocity. There was no sign of pressure on the primers in the Super Speed cases, but even with this reduced load I had one pinhole rupture in a Peters cased primer, and the primers in all the Peters, Remington and Norma cases showed extrusion into the striker hole.

I have chronographed 23 grs. Ball C many times in this gun, in Super Speed cases, and got much more consistent reading than the above 21 grains gave. Note that the consistency was better in the heavier cases, above. Apparently, Ball C burns better at near maximum pressure. **Of course, this was only a small sample.**

PRESSURE ESTIMATION BY CHRONOGRAPH

According to Homer S. Powley, it is now possible for one to use a chronograph with rifles using DuPont's I. M. R. powders for accurately estimating the maximum pressure developed.

The method is based on the ratio of average pressure in the bore to the maximum pressure. In the past, effective average pressure has been calculated from bullet mass, square of muzzle velocity and bore dimensions. This has been rather unsuccessfully related to maximum pressure.

Homer Powley has refined previous methods by allowing not only for mass of bullet but the mass of a portion of the powder gas and average frictional effects to compute average pressure. This average pressure is related to the maximum pressure by allowing for the ratio of powder charge to bullet weight as well as the number of times the gas expands in moving the bullet through the bore.

Velocities	**Ave.**
2725, 2786, 2770, 2817, 2817	2783
2817, 2833, 2801, 2817, 2817	2817
2833, 2849, 2817, 2865	2841
2817, 2786, 2833, 2833, 2786	2811

Maximum pressures recorded on copper crusher gauges are used in commercial ammunition manufacture for quality control in production. These gauges are quite satisfactory for the intended purpose since all readings are comparable to each other. The coppers are calibrated in static pressure devices. However, the readings are ten to twenty per cent below actual pressures, the fluctuations being due to the differences in burning rates of the powders and the sharpness, or lack of it, on the pressure peak. Copper crushers can indicate true pressures rather accurately if the coppers are precompressed and the calibrated by a dynamic method such as a drop-hammer. However, such methods are used for research and do not change the order of magnitude.

Pressures and velocities which have been published by ballistic testing laboratories are usually higher than that obtained in standard guns. Pressure guns usually have minimum chambers and barrels and the latter are sometimes longer than usual guns. The pressure developed determines the percentage of total energy transmitted to the bullet and the bullet velocity can be calculated to energy so as to reveal what gun has the same pressure-velocity relationship as a pressure gun in spite of the fact that you develop a different velocity and pressure was developed. Your standard pressure with the same loading components. Anything which changes pressure will be reflected in the velocity.

We cannot expect to check all published pressures with exactness, but using this method will necessarily give very good values for **differences** in pressures resulting from deliberately made changes in loading. This is especially important to handloaders.

In order to carry out the computation of average pressure and from it the maximum pressure, somewhat complicated algebric relationships are necessary. Mr. Powley has simplified this to a brief set of instructions and has prepared three calculating charts so that simple arithmetic can be used for measurements on the gun and subsequent figuring. With practice, ten minutes may be required.

A set of charts and instructions may be obtained from Marian Powley, 17623 Winslow Road, Cleveland 20, Ohio, at a cost of $10.00, postpaid.

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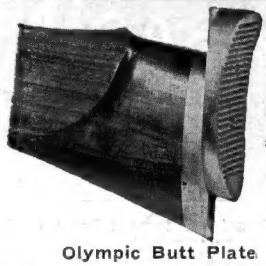

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Swiss Type Palm Rest

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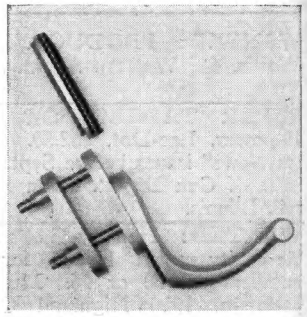
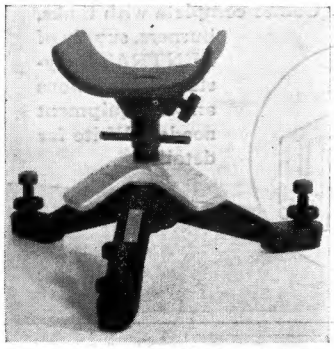
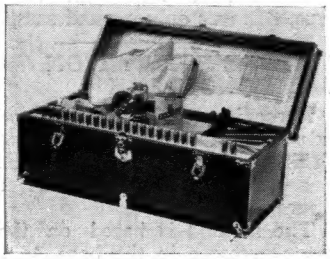


Freeland "61" International Butt Plate $33.00



Standard Benchrest Stand $20.00

Supreme Benchrest Stand $30.00



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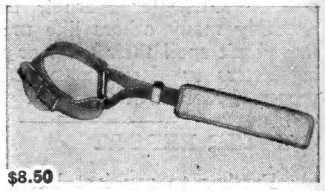

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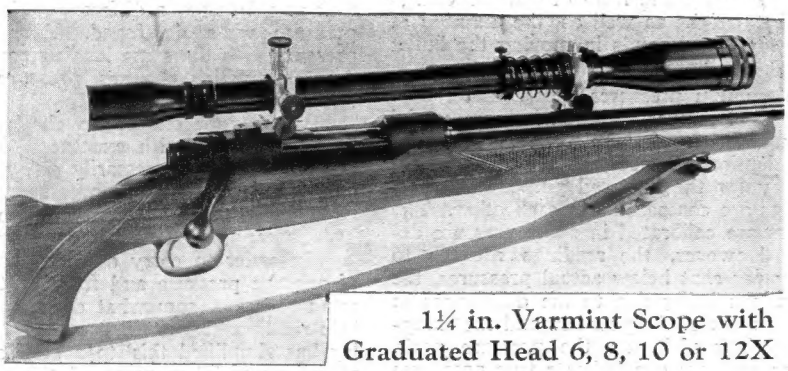

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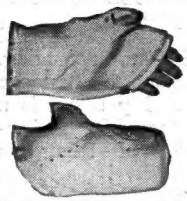

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